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ANNUAL REPORT

1942

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Report of the

Allegheny Forest Experiment Station

for 1942

The first year of war has seen the end of surplus labor, surplus food, and surplus lumber. The Nation faces two major tasks: all-out production, and all-out war. War preparation on the home front and rear guard action on the fighting front seems now to be giving way to full-scale production at home and battle initiative abroad. Even more aggressive action can be expected of the United Nations in 1943. This will engage an important percentage of our total military strength and will consume vast quantities of supplies. Vast supplies also will be needed to rehabilitate territories regained from the enemy. No respite from the military campaigns by our armed forces nor from economic stringency at home can be expected before the war ends. Meanwhile, all commodities and all labor in the United States will become scarcer and scarcer and all activities not directly supporting the war effort harder and harder to justify. Having these things in mind, the Station's accomplishments and plans for the coming year are here reviewed under three headings: (1) Those that support our war effort; (2) those that will contribute directly to the task of readjustment and reconstruction immediately following the war; and (3) those necessary to prevent serious loss to long-time research work clearly needed in the post-war period.

THE STATION STRIPS FOR WAR

The year 1942 has brought the most profound changes in the Station's history. The outbreak of war and the new responsibilities that this implied necessitated a reconsideration of the entire program. Each project not directly or indirectly supporting the war effort had to be put in shape for an indefinite period of quiescence. Each man has to organize his own work so that it could be dropped for an indefinite period with a minimum loss of valuable research results. Considerable success has attended our efforts. Two major manuscripts that had been on the Station's dockets for three years or longer were prepared for publication. A number of minor studies were completed. One entire line of work, flood control surveys, was discontinued. All forest management work except those jobs specifically requested by war agencies was placed on a maintenance level. The major event, however, was the closing of the Northeastern Station and the transfer to the Allegheny of its technical staff, its files, property, experimental forests, and three of its important projects. This action required even greater effort on the part of Northeastern personnel to bring their work up to date so that as little as possible would be lost during the period in which the territory remains closed to regular research activities. Personnel released by the Northeastern Station were made available for new war assignments at the Allegheny, and for filling places vacated by Allegheny staff members already called into the armed forces. To absorb this personnel into the Allegheny Station required a complete reorganization of both the technical and clerical staffs. Important

changes in assignments have been necessary. This reorganization has enabled the Station to release five technical men for full-time war work and six technical men for part-time war work. The Station was also obliged to employ some additional personnel to carry out war jobs, and gained by transfer from the Washington Office and the Appalachian Station two valuable research workers.

WAR TASKS FOR RESEARCH

Supplies and Requirements Surveys

Events whose shadows could be dimly made out at the time the 1941 Annual Report of the Station was written have since become realities. Transportation of forest products both by rail and coastwise shipping is tight. War requirements overran lumber production by some 6 million board feet in 1942. Requirements for 1943 are still ill-defined, though it seems certain that domestic use will decline and export requirements increase. The Forest Service is working in closest cooperation with the War Production Board in forecasting requirements and in estimating how these requirements can best be met. In this task, thought is given not only to cutting timber, moving logs, and sawing lumber, but also to how war requirements can be met with as little permanent damage as possible to forest productive capacity. Such important tasks as keeping abreast of supplies and requirements in several fields of forest products have absorbed the Station's major attention in recent months. Certain important obstacles make this job particularly difficult in our territory; namely, the large number of producing sawmills; the lack of important lumber producers associations to whom we could look for aid; the lack of complete information on lumber production; the lack of a forest survey from which to base estimates of timber supplies and timber requirements; and finally, the closing of the Northeastern Station from which a large part of the work would have been done.

The first major task has been to supply monthly information on trends in lumber production. To do this the Station has selected some 500 sawmills from its territory carefully distributed as to size and location, from which monthly production figures can be obtained. These serve as a sample for calculating total production. An appraisal is being made quarterly of the extent to which lumber production is inhibited by shortages of labor, capital, logs, and equipment; by ceiling prices on lumber; by length of work week; and other real or imaginary factors. Surveys of lumber stocks at mills are also made quarterly. An early survey of the condition of equipment now in use by the lumber industry is anticipated with a view towards determining specifically the extent to which new equipment is needed to maintain or increase production. Probably surveys of inventories in concentration yards, wholesale and retail yards, will be called for soon. Information is now being assembled on the number, capacity, and location of lumber dry kilns in the territory, including those owned by sawmills and by secondary manufacturers. It is expected that these surveys will continue during the coming year and that information on more and more factors will be requested if production falls further below requirements.

Closely related to the studies on lumber production have been those made of pulpwood production and prices, plywood manufacturing facilities and costs, fuelwood costs and supplies, and of birch timber suitable for veneer. These, like the foregoing studies of lumber production, were carried out at the request of the War Production Board and the data collected, all of it confidential in nature, are turned over to WPB and OPA to aid them in predicting supplies, allocating equipment, and regulating prices.

Lumber Production in 1941

Indispensable to intelligent allocation of lumber in the war effort is accurate information on total production and on how this production is distributed geographically, by species and grade of product, and by sawmill size. Last year, for the first time the Allegheny and Northeastern Stations participated with the Bureau of the Census to determine the lumber produced. This involved furnishing the Bureau of the Census with our best up-to-date list of sawmills, editing and summarizing data from questionnaires sent in from mills, estimating total production by states based on preliminary returns from the questionnaires and other information, and finally following up on delinquents and ferreting out mills of which we had no record. All mills in the states of New Hempshire, Massachusetts, Rhode Island, Connecticut, New Jersey, Delaware, and Maryland not reporting by mail were canvassed in the field. The virtual impossibility of obtaining complete records of lumber production from mail canvasses alone, upon which the Bureau of the Census had previously depended, was strikingly illustrated by the results in the Allegheny and Northeastern territories. In the first place, it is difficult to get complete mailing lists without a field force to check with local agencies familiar with sawmill operators. Due largely to the Station's efforts, the number of mills reporting from the states of New York, Vermont, and Maine increased from 671 to 989, and from Pennsylvania from 369 to 859 between the years 1940 and 1941. Even so, mail returns in these states resulted in only 70 percent coverage of known mills. Returns were obtained from 3,504 mills in 1941 as opposed to only 1,614 in 1940. Two facts from the lumber census are of outstanding importance to the War Production Board and others interested in an increase in lumber production. The first is the large number of mills in the territory, estimated at over 4,000 in all. The second is that 70 percent of these mills produce less than 500,000 board feet during the year. Inasmuch as almost any sawmill has a theoretical capacity of at least 5,000 feet per day, 70 percent of the mills operated on the average for less than 50 days during 1941. These same mills produced only 379 million feet, or 20 percent of the total lumber sawn. Here is substantial productive capacity remaining relatively idle when our country badly needs their products.

A complete canvass of all mills in the territory has been planned for 1943. Obtaining accurate figures on lumber production in the eleven states included in the Station's territory is both time-consuming and expensive. The work done in 1941 took a total of 352 days' field work

by technical men, and 215 days of office work. It required 22,860 miles of travel, and cost the Stations a total of $6,614. The Bureau of the Census reimbursed the Stations to the extent of $1,897, or 29 percent of the total cost.

Fire Studies

In peacetime, forest fires are a menace chiefly to the forest and to man's improvements located in or near the forest. In wartime they represent a threat to national existence through impeding traffic by air, sea, and land, interfering with submarine detection, diverting manpower from war production to fire fighting, and destroying important war supplies. Regular research in forest fire control was laid aside last year to concentrate on steps to assure that the best techniques devised by research would become standard practice by fire protection organizations. The Station assisted Region 7 of the Forest Service and State protective agencies in the installation and inspection of forest fire danger stations from Long Island through Cape Charles, Virginia. This job was done at the request of the Army and was a necessary adjunct to special studies of a highly confidential nature that form an integral part of our national defense program.

Camouflage Service and Studies

Modern warfare requires two types of land camouflage. The first is concealment of personnel and materiel against enemy gunfire; the second is to screen factories and other installations far behind the ground fronts against aerial bombardment. Unlike artillery targets that can be effectively shelled by indirect fire, an aerial bomber's target must be seen to be hit; and for precision, high altitude bombing it must be seen at a distance of five to seven miles. Because the bombardier has only a few seconds in which to make out his target, complete concealment is not necessary, but confusion of outlines is. In bright sunlight, shadows are the blackest appearing objects from high altitudes, therefore shadow outlines must be broken. Woody vegetation is the most effective material found for this purpose.

Soon after the Secretary of Agriculture made known to the War and Navy Departments that special technical services could be made available to aid them in camouflaging military installations, the Station was called upon by the Army engineers and by the Navy to advise on special soil stabilization planting, camouflage planting, and tree and shrub care at Fort Miles, Delaware, Fort Belvoir, Virginia, the Naval Air Station at Anacostia, and a Naval Airport near Brunswick, Maine. Field examinations were made in each case and special written instructions prepared.

Important as they are, these service jobs have been dwarfed in the Station's program by a more comprehensive request from the Army Engineers. This office asked the Forest Service and the Bureau of Plant Industry to carry on a series of investigations to determine the usefulness of plant hormones and other chemical substances in camouflage planting. The project fitted directly into the Station's field program

at the Beltsville Forest Laboratory, and the urgency of the request enabled us for the first time to divert sufficient manpower and funds to Beltsville to place this Station on a capacity operating basis. Investigators were transferred to Beltsville from Philadelphia, from the Appalachian Station, and from the Washington Office. A CPS detachment of some sixteen men, among them thoroughly trained foresters, plant pathologists, and biochemists, was also assigned to this work. The program includes the following studies: Treating small and large transplant size nursery stock with growth regulating substances and plant nutrients to increase field survival through improving drought resistance, winter hardiness, and increasing food reserves; treating nursery stock held in storage with growth regulators to improve vigor and prolong dormancy; using growth regulators and nutrients to hasten the healing of tree wounds and to stimulate rapid growth of foliage to provide effective concealment and soil stabilization; testing the effect of chemicals used to preserve cloth seedbed coverings on the germination and early survival of seedlings.

In preliminary tests, roots soaked in an aqueous solution of indolebutyric acid increased in growth rate and number of branch roots. The effect appeared to be more pronounced in trees having a large amount of food reserves. In contrast, an arrestment in development of tender growing tips of loblolly and slash pine seedlings was effected by soaking their tops in solutions containing 1 gram of indolebutyric acid per liter of water. The new growth hardened and remained dormant for about 10 weeks before resuming growth in early August. In the meantime, moderately good root development proceeded, and by the end of September good top growth had occurred and buds were set for winter. This treatment offers promise that the planting season, normally limited to a few weeks in late fall and early spring, can be extended throughout the summer, thereby vastly increasing the usefulness of vegetation for camouflage planting. Spraying the tops of large transplant stock with naphthalene acetic acid definitely delayed leaf fall in white ash, but appeared to hasten the browning and falling off of foliage on the interior of the crowns of arborvitae. Lanolin applied to tree wounds made in late September appears to cause marked proliferation of ray cells which produce callous over the wounds. However, the tissue so formed was not frost-hardy. No ray cell proliferation occurred in wounds treated with shellac, which has been almost universally used in wound dressings. Shellac has the further disadvantage of cracking and not maintaining a uniform coating against the entrance of disease-causing organisms.

In addition to these detailed investigations, by request a special manual was prepared for the guidance of Army engineers who use woody vegetation for camouflage planting. Plans for next year call for vigorous follow-up on all phases of the studies initiated during the past summer and fall, and the prompt reporting to the Army engineers of results that give definite promise of improving survival and growth.

Helping Labor to Harvest More Wood and Earn More Money

Throughout the country, woods work is hampered by lack of skilled workmen. Logging and wood cutting are hard physical work and require a degree of skill and judgment comparable with that of well-paid jobs in war industries. With their ranks already depleted by calls to military service and by migration to well-paid industrial jobs, timber workers are critically short. Job freezing has already been resorted to, but this has come too late to be fully effective. Moreover, labor frozen on a job is likely to become restless and may slow down production, unless the workers feel that they are receiving as fair treatment as those in other fields. To meet the situation it is therefore important that individual workmen produce more and be paid more than formerly.

The Northern Allegheny Plateau is one of the nation's three centers of wood chemical production, an industry whose products are used in making explosives, steel, gas masks, and other war materials and in the purification of water supplies for the millions on the home front. As a shortage of skilled woods labor was already hampering production, a time study was undertaken to determine if the customary practice of clear-cutting chemical wood down to a 3" diameter had been wasting manpower as well as timber. This study showed that it takes twice as much time to cut a cord of chemical wood from 4" trees as from 12" trees. What this means to the wood cutter in terms of trees he must cut and daily earnings at $3.00 per cord is shown below. When all

Diameter of Tree	Trees per Cord	Daily Earnings
Inches	Number	
4	48	$3.48
8	9.3	6.21
12	3.4	7.14
16	1.4	7.26

trees below 7" were left there was a saving of 10 percent in time per cord and 19 percent in time per cubic foot of wood produced. The pole skidding method which has been well worked out in the spruce pulpwood region proved to be very suitable to chemical wood operations. It is cheaper than the usual draying method for distances up to about 600', eliminates the investment in draying equipment, and encourages mechanization of bucking and splitting as it centralizes this work at a yarding spot. From a silvicultural standpoint the biggest advantage of pole skidding is that it is inconsistent with clear cutting. Small trees are a nuisance to handle when operating by this method. The Gray Chemical Company, on whose land the experiment was conducted, now has five operations run on a pole-skidding basis, and other companies are evincing interest in adopting it on their own operations.

The northern hardwood forest yields many woods of high technical excellence, among them birch and maple for aircraft veneers, beech for beds and cots, cherry for gun stocks, ash for snowshoes, and hemlock for general construction. Now when all possible lumber production is required for our war effort, attention has again been focused on the effect of selective cutting on logging efficiency. In cooperation with the Allegheny National Forest, the Station studied the man hours required in light and heavy selection cutting operations. The results based on cuts of 71 and 52 M.B.F. for the heavy and light cutting respectively were as follows:

	Light Cutting	Heavy Cutting
Cut per acre, M.B.F.	2.6	4.9
Average diameter of trees cut, inches	21	17
Labor required per M.B.F.		
Log making	4.5 man hours	5.3 man hours
Clearing skidways	2.9 " "	4.0 " "
Skidding	5.1 " "	4.8 " "
Total	12.5 man hours	14.1 man hours

Skidding costs were slightly greater where only 2.6 M.B.F. were removed per acre, but this increase was more than offset by economies in log making and skidway construction. Individual time records on trees ranging from 10 to over 30 inches in diameter showed a sharp inverse relation between tree size and log making cost. Logs made from 29-inch trees required 3.8 man-hours per M.B.F., whereas those made from 15-inch trees required 6.4 man-hours per M.B.F. For trees below 15 inches in diameter logging costs increased much more rapidly. Logging damage due to felling and skidding decreased from 17 trees per acre of all sizes 0.6 inches d.b.h. and larger, where 4.7 M.B.F. were removed, to 11 trees per acre on the lightly cut area. Both of these studies clearly support the contention of foresters that clear cutting large, contiguous blocks of second-growth Eastern hardwood timber is neither a necessary nor an economical method of harvesting wood for war.

Additional studies of the effect of partial cutting on logging costs are being carried out at Cooperstown, New York, on the operations of the Otsego Forest Products Cooperative Association. These, together with general operating cost statements of this Association, have done a great deal to focus attention on some of the major problems of lumber production during wartimes. Here, the volume of material removed from each individual woodlot appears as an important element influencing costs. The fixed charges incident to a logging contract - that is, obtaining the owner's consent to cut and arranging with fellers, skidders, and haulers to handle the job - render operations of less than about 10M board feet inefficient for the Association.

Migration of experienced woods labor to war and to war industries has thrown the fuelwood harvesting industry in Connecticut into virtually a state of chaos, and this at a time when fuel of all sorts is alarmingly scarce. A recent check on performance from one company shows their 26 cutters to average only 5-1/2 cords per week cutting hardwoods, or 7-1/2 cords cutting blow-down pine. Experienced cutters should produce almost twice as much. Low output results from inexperience in woods work and disinclination of workers to learn new methods or to work enough hours. Time lost through illness and drunkenness also is high. The Station's farm forest research project, designed to lower costs and increase production of fuelwood, has in consequence hit a difficult snag. Important results are available indicating many steps that will increase efficiency, but disorganization of the work prevents their adoption. A vigorous action program is required to put existing results into practice and to organize the field so that additional research can be helpful. Tests of burning hogged wood in a state institution were again deferred because priorities delayed procurement of essential equipment.

The project forester contributed to two publications of the Connecticut Forest and Park Association, one entitled, "How to cut wood with less labor", and the other, "How to burn wood". A Northeastern Wood Utilization Council made up of men from New England and adjacent areas has been organized to promote and coordinate cooperative research in this field. The project forester acts as their field agent. Members are working on the development of portable power saws, wood gas engines, wood-burning stoves and furnaces, portable charcoal kilns, and one of the latest developments, a unit for burning wood gas in ordinary furnaces. Wood in the fuel magazine of the new unit is distilled into gas which is introduced into the fire pot of the furnace after adding secondary air. Green wood can be used. The Connecticut Agricultural Experiment Station has issued a bulletin on this so-called "dutch oven."

Plans for next year will be concentrated chiefly on getting the cost of producing mine timbers in the anthracite or bituminous mine fields, and the cost of producing saw timber by the Otsego Forest Products Cooperative Association. A special study of the cost of producing fuelwood from defective trees of saw-timber size will be undertaken at Cooperstown, using labor from the CPS Camp, largely inexperienced. The extent to which the Station can carry on studies in this field will be limited to a large extent by the availability of woods labor and by the press of more important war assignments.

Surveys of Forest Resources

The heavy requirements of war industries for lumber and other forest products have brought prominently to the fore the need for a survey of the forest resources of the Alleghany and Northeastern territories. Some information is already available. This includes surveys of national forest timber and of forest farming units made by the Regional Office, of state forests, and of a few industrial holdings. The Station participated in three surveys last year: farm woodlands of Gloucester County, New Jersey; an area located within some thirty-odd miles of

Cooperstown, New York; and Carbon, Lackawanna, Sullivan, Susquehanna, Wayne, and Wyoming counties in the Anthracite Region of Pennsylvania.

Especially worthy of note are the improvements that the Station has been able to make in survey design and survey technique. For instance, where saw-timber stands form a relatively small percentage of the total area, it becomes unduly burdensome to space survey lines close enough together to get an adequate estimate of saw timber, provided these lines are run through in the usual manner. To avoid doing this, the Station conducts timber surveys in two stages. The preliminary survey is designed to yield information on the volume in cordwood stands within the desired limits of accuracy, and a supporting survey is run through saw-timber stands to increase the accuracy of estimates of the large timber. Areas of saw timber can be roughly delineated on aerial photographs. To avoid error in judgment, all questionable areas are listed for field examination. Plot tallies need only be taken where inspection reveals sufficient number of trees of saw-timber size to constitute a volume of 2,000 board feet per acre or more.

In conjunction with this work, the Station has improved very markedly the accuracy with which timber can be estimated directly from aerial photographs. The technique involves the following steps: for each plot of known area delineated on the photograph estimating average tree height with stereoscopic vision from tree shadow lengths; tallying the trees; and computing volumes per acre, using special local volume tables based on tree height. Results so far indicate that an estimate accurate to within less than twenty percent can be expected from this type of survey without any ground work other than that necessary to build the volume table.

A LOOK AHEAD TO PEACE

Suppressing the Axis armies will not immediately restore peace and prosperity to the world. A long period of reconstruction must intervene before new governments capable of maintaining order and caring for their people will arise in Axis-conquered lands. Feeding the population in war-ridden countries is the first task. Rebuilding homes, cities, and factories must follow. These will require continued full production from our farms and forests. At home, our great armament and munition factories must be shifted to peacetime work. Such a shift probably will require at least a year; meanwhile, large numbers of people are likely to be thrown out of work and many soldiers will be discharged. Materials necessary to support an ambitious public works program will not be available immediately. Therefore, it seems likely that our country will again turn to work on the land, in forests and public parks to absorb labor.

Vast strides were made in putting our national forests in good physical shape under the old CCC and other emergency programs. It is time to consider how such programs can be extended to private lands when the war ends. Because of the accessibility and high productivity of private land, effort expended on them is likely to return more in terms of timber yield than that spent on public lands. Special safeguards

must be worked out to insure that the public effort be not wasted due to mishandling of private lands by the owner. This may be brought about by overall regulation of forest land management or by special agreements with individual land owners, such as was contemplated under the proposed forest leasing act. Projects on private land might very well include the whole gamut of activity carried out on public lands by the CCC and other works agencies. It might also include the harvesting of some timber for use in housing and public construction, where this timber would otherwise go to waste or comes from trees that are interfering with their more valuable associates in the forest. The planting of waste lands should be an important feature of the program, although it will be difficult to have planting stock available as soon as the war ends. Certain tasks, such as the conversion of scrub oak lands to valuable forest types and the conversion of worthless hardwood swamps to white-cedar, can absorb large amounts of labor yet require relatively small amounts of planting stock. Such projects probably will receive high priority when the war ends.

So far, the Station has not been drawn directly into post-war planning in forestry other than the work that it has been carrying as a part of its regular projects. It is obvious, however, that if the post-war world is to see full use made of our forest resources, prompt extension of survey projects such as we have been carrying out in the Anthracite Region will be called for. These will be followed by interpretation of data and the organization of local working circles that can be managed ultimately on a sustained yield basis. Certainly, one of the jobs we should plan to complete as soon as possible after the war ends is the forest survey for the whole of the Northeast. Whether this job should be carried out as it has been in the South, Lake States, and West, or whether we need a more detailed inventory showing timber volume, growth, and drain by counties, will have to be decided. This in turn will depend in part upon the need for helping local communities to organize sustained yield working circles.

Luzerne - A sample county

Some idea can be formulated as to the type of information that will be needed to build up community working circles throughout the forested regions of our country, from the Luzerne County Report. This study included a determination of the forest products used by the county, of the relationship of this use to local industries, particularly the mining industry; a survey of the existing forest land, by whom it is owned, the volume of timber it supports, how fast this timber is growing, and of the current rate at which the timber is being harvested for various uses. The report also estimated the extent to which forest productivity could be increased by adopting good forest practices, and appraised the benefits that would accrue from increased production after it is achieved. Special attention was paid to the possibilities of increasing the labor income from forests through better care of timber lands and more intensive use of forest products.

Some of the outstanding results are the following: The forests produced in 1940 6,382,000 board feet of lumber, and 122,500 tons of props. It

is estimated that production by 1980 could be increased to 45,000,000 board feet annually and 360,000 tons of mine timbers. Present yearlong jobs total 276, whereas they might total 3,000 if new wood-using industries spring up. Present value of forest products is $650,000 and ultimately this might be $7,500,000. Income to forest owners is now $120,000 and could be as high as $375,000. If Luzerne County is to realize a potential production of 45,000,000 board feet annually from her forests, it will be necessary for her to change cutting practices radically. The current clear-cutting for mine timbers must give way to selective cutting for all sizes of products.

While a considerable improvement can be expected in the methods of handling woodlands through voluntary action, it is pointed out that more drastic measures will probably be required to achieve the objective. Possibilities of regulation of timber land management at the county level are set forth. Steps are already under way to develop certain features of the action program, notably improvements in fire protection and a timber harvesting service for private owners. A great deal remains to be done for which the initiative must come from local sources. Closing of the Works Progress Administration will seriously handicap further survey work during 1943, but it is hoped that this loss can be offset in part by using CPS help and through even larger resort to aerial photographs. During the coming year, reports will be prepared for Lackawanna and possibly other counties. A general zoning of the entire region will be carried out and planning developed on a region-wide basis. New action programs will be encouraged through a forest farming project, and new nuclei of interest stimulated to push action programs in other counties.

Cooperative Marketing of Timber Products

One of the astounding economic developments in the United States during the past fifteen years has been the growth of the cooperative movement. Farmers who began by sharing one another's gasoline supply tanks ultimately came to manage and own oil refineries, oil pipe lines and even oil wells. Others who thought to obtain cheaper fertilizer by pooling their buying power to obtain carload lots are now associated with many others in operating large fertilizer plants. Cooperative insurance now furnishes a complete line of service for farmers and city dwellers alike, and cooperative food stores have ushered in a new era of frankness and honesty in the merchandising of food products.

With these great successes as background, it is only natural that farmers should attempt to market products from their woodlands on a cooperative basis. Several such cooperatives now exist in the United States, but none approach in size of membership and completeness of services the Otsego Forest Products Cooperative Association of Cooperstown, New York. The Northeastern Forest Experiment Station has been associated with this cooperative from the beginning. Its many trials and vicissitudes are widely known. The mistakes it has made and the successes it has achieved are matters of utmost importance to similar cooperatives already established and those that can be expected to arise in the near future.

Many people believe that cooperatives have a unique and important role to play in the reconstruction period following the war and in the new era to come. This belief is founded in part on the conviction that small private businesses will suffer acutely during the war, and that few of them will be able to compete successfully with state-controlled production of other nations after the war is over. A cooperative economy offers an alternative to state control. It promises to produce goods and services as cheaply as competitive capitalism, and at the same time avoid the recurrent disturbances to economic stability inherent in the capitalistic system. It promotes true economic democracy and is free from the heavy hand of political bureaucracy. For these many reasons, the Station is fully justified in continuing to devote a large percentage of its effort to studying the cooperative marketing of woodland products.

The performance of the Otsego Forest Products Cooperative Association during the past calendar year has been greatly affected by the war. More than 95 percent of the mill's output has gone directly into the war effort. Stocks have been greatly reduced by this same demand. Member logging operations were greatly curtailed because of shortages in labor on the farm. A large proportion of the log procurement job became the direct responsibility of the management at a time when equipment and skilled labor have been at a premium. Weather conditions more unfavorable than usual also interfered seriously with logging operations. But perhaps most serious of all has been the fact that the Association's plant was designed for serving a larger membership and a variety of needs, many of which ceased to exist when the war program got under way in 1940. This plant will likely be badly needed by the farmers as soon as the war is over, but the task of operating it successfully during the war period is far from simple. General interest in the Association as evinced by credit standing and public acceptance improved measurably. Membership increased from 765 to 920, but nonmembers hesitate to join now while they do not have labor with which to carry on their own woods work. After the war, it is quite probable they will welcome the outlet for their labor and equipment which the Association provides.

Conversion of Hardwood Swamps to Cedar

Stands of 60-year-old Atlantic white cedar in New Jersey are worth from $200 to $300 per acre. Swamp hardwoods that now occupy some 115,000 acres, on the other hand, have no commercial value whatsoever. Slash fires in the past are mainly responsible for the disappearance of cedar from swamps and the ascendancy of hardwoods. An extensive series of experiments was undertaken last year to determine the possibilities of converting these swamps to cedar through artificial seeding and planting and through natural seeding from available seed trees. One interesting lead being followed up is the planting of peat moss containing stored cedar seed. Best conditions are created by cutting or girdling the hardwood overstory and mowing the small trees and brush. Without this treatment, cedar is unable to invade hardwoods successfully. Developing complete instructions for converting hardwood swamps to cedar is planned for next year, so that technical information will be available for launching a post-war program.

Flood Control Surveys

Floods that caused terrific damage in many Pennsylvania communities last year and serious interruption to war industries and railroads emphasize that long-term programs for flood control cannot be dismissed from mind even during the great emergencies of war. Among the serious flood damages of the past year were the following: A dam across the Lackawaxen River broke, flooding the town of Honesdale, Pennsylvania, and downstream reaches; the same heavy storm on the Pocono Plateau washed out railway bridges near Moscow, Pennsylvania, and undermined railway embankments along the Lehigh River from White Haven to Mauch Chunk.

Close to 100 boulder and mud slides flowed down the slopes of the Lehigh Valley gorge, blocking the railways and paving the way for new slides. Minor train accidents occurred in the Lehigh River gorge and near Lancaster, Pennsylvania, where boulders fell on passing trains. A far more serious accident resulting from floods occurred near Aquilla, Pennsylvania, where a boulder fell on a highway, crushing a motor bus loaded with war workers. Floods on the upper Allegheny and the upper reaches of the West Fork of the Susquehanna wiped out a silk throwing mill, caused very heavy damage to homes, and destroyed a new highway bridge in Port Allegheny, Pennsylvania; put the Gray Wood Chemical plant out of operation for weeks, demolished a pulp mill and the town housing its workers at Austin, Pennsylvania; and seriously damaged industries at Coudersport, Johnsonburg, and other towns. Finally, a flood in late November on the Potomac threatened our nation's capital, Washington, D. C., tied up railway traffic, and caused serious damage to industries and homes located near the river bank.

These floods resulted from four separate storms. It is believed that much of the damage, particularly that due to mud and boulder slides, could be minimized in the future by maintaining proper vegetative cover over the affected areas and the watersheds that contribute the damaging flood runoff.

Although no additional work was done on flood control surveys last year, other than to complete the preliminary examinations on the Allegheny and Juniata Rivers, it is well to list under possible post-war projects the flood control program and surveys that have been recommended. Surveys have been completed for the Upper Susquehanna, the Youghiogheny, Connecticut, and Buffalo Creek watersheds. The cost and benefits from the programs recommended are shown in the table below:

Flood Control Projects Recommended

Watershed	Total cost of Forest program	Total benefits from forest program	Benefits per dollar of cost
	Dollars	Dollars	Dollars
Upper Susquehanna	5,818,000	7,711,000	1.33
Youghiogheny	1,786,000	2,059,000	1.15
Connecticut (includes farm benefits and costs)	3,537,000	7,258,000	2.04
Buffalo Creek (includes farm benefits & costs)	2,516,000	3,029,000	1.20

In addition, preliminary examinations of incompleted reports have been prepared for the Merrimack, Allegheny, Juniata, and Lehigh Rivers, all of which give promise that a Department of Agriculture flood control program would result in benefits in excess of cost. Negative reports have been turned in on Codorus and Blackstone Creeks. It is unfortunate that more watersheds have not been carefully surveyed, but the number so far covered is adequate for the initiation of a vigorous flood control program in post-war years.

These are but a few of the tasks to which our people can turn their hands as soon as the war ends. Meanwhile, post-war planning for Northeast agriculture is just getting under way. As it expands, new tasks will confront the Station, leading, it is hoped, to bolder and more far-reaching plans for post-war forestry. The Station will continue its analysis of anthracite forest problems and the synthesis of forest rehabilitation programs. In this job, technique will likely be developed that can be applied throughout the territory.

FOREST RESEARCH AND THE NEW AGE OF WOOD

The past decade has seen tremendous advance in uses of wood. These extend all the way from processes which break down wood completely, and convert it into such products as alcohol, sugar, and lubricants, to partial breakdown that converts wood into rayons, cellophanes, and wood plastics, through the more common uses to new moulded plywoods, laminated arches, and prefabricated panels for housing. These new uses suggest that wood in all forms and of all quality will continue to be in great demand in the future. The forest experiment station would indeed be short-sighted if it did not give thought to maintaining, even during periods of great national danger, those phases of its program that will be essential to realizing ultimately the maximum benefits that forests can confer on mankind. It is, however, perfectly feasible and proper to keep maintenance work on such studies at a minimum during wartime.

Growing the Timber Crops

To realize the many blessings that a new age of wood can confer upon mankind presupposes that wood will be available in generous quantities. This requires working out management techniques that will assure high productivity of forest land on the one hand, and high productivity of forest labor on the other. An enduring age of wood cannot be built on low wages to woods workers or high prices to wood users. The goals of forest management research are to work out techniques to avoid the evils of scarcity and high prices of forest products. It is to achieve these goals that the Station continues some of the more important phases of its management program.

Data on weeding, thinning, and planting projects were collected last summer as a part of the maintenance program. The results of these studies have been worked up in shape to be used in the post-war period, when operations of this type again form a legitimate part of the regular forest program. Plots laid out in a loblolly pine stand in 1941 were

cut over and placed in shape for subsequent examination. A series of study quadrats were laid out in the Tionecta Natural Area and photographed. These will be reexamined periodically to note important changes in tree reproduction and other features of the vegetation that occur over long periods in undisturbed forests, thereby furnishing clues to more successful management of the northern hardwood forest.

Gratifying progress was made in the research program in the oak-pine type at the Standing Stone Experimental Forest. This program was carried on by the Department of Forestry of Pennsylvania State College. Work under way includes harvest cuttings in Virginia pine, improvement cuttings in white pine and Virginia pine, reproduction studies in oak, and site indicators for Virginia pine. Virginia pine is a particularly short-lived tree, and on the Standing Stone Experimental Forest occurs in mixtures with table mountain pine, white pine, pitch pine, and scattered hardwoods. Valuable chiefly for pulpwood, both Virginia pine and table mountain pine become decadent at about 50 to 60 years of age before reaching saw-timber size. An experiment was undertaken to determine whether or not stands can be partially cut at 40 and 50 years, using a flexible 9-inch diameter limit, holding the smaller-sized trees until they have attained good pulpwood size.

Many Virginia pine stands are typically understocked in early youth. Frequently this is the result of a few scattered trees becoming established in open fields and these in turn seeding up the surrounding area. To improve these stands, the old seed trees need to be removed and the thickets thinned. Studies of the feasibility and practical results of such improvement cuttings are under way. White pine where it occurs in the oak type of Pennsylvania usually contains a large number of limby trees, often with crooked boles, the result of weevil attack in the sapling stage. Smaller trees are usually straighter and offer much greater promise for saw timber. A preliminary harvest cutting experiment was undertaken in such a stand, with a view towards obtaining cash income from the poorer grade trees and leaving a well-stocked stand for future growth.

Many of the oak stands in central Pennsylvania are poorly stocked. This is due in part to past fires and to limited availability of seed in the young stands. It also appears to be correlated with aspect; for instance, north and east slopes were found to contain far more seedlings than south and west slopes. The greater density of seedlings on the north and east slopes may be due in part to the higher humus content of the soil on slopes protected against the hot afternoon sun. A preliminary study was made to determine the possibilities of discovering indicator plants for sites 1, 2, and 3 for Virginia pine. Ground pine, Canada mayflower, and tick trefoil were very characteristic of site 1. Wintergreen also was found chiefly on site 1, but was of irregular occurrence. Convolvulus spithameous, on the other hand, appeared to be a good indicator of site 3. Aside from the research work begun on the Standing Stone Experimental Forest, substantial progress was made in inventorying the timber and dividing the area into compartments as a basis for drafting a management plan.

Applying better management techniques in existing forest types is one method of increasing the abundance and cheapness of wood; developing entirely new tree forms through controlled breeding is another. Of all the Station's projects, perhaps none more truly merits special consideration during the war period than the genetics work. This field of research is new both at home and abroad. Research in genetics is a long-time task even for short generation material such as fruit flies. For trees that require from 4 to 20 years or more to attain seed-bearing age, the program is even more exacting as to time requirements. It would, in fact, be an almost hopeless task were it not possible to make certain short cuts, such as grafting shoots of new hybrids to trees that have already attained seed-bearing size; developing hybrid seed from flower-bearing branches cultivated in nutrient solutions in the greenhouse; developing methods of storing pollen; applying new methods of vegetative propagation to multiply and use immediately elite types; and numerous other new techniques that greatly aid the tree breeder.

The breeding program which the Northeastern Station has been carrying for the last six years has resulted in the production of some 21,600 seedlings, representing several hundred progenies. It is extremely important that the individual plants be cared for, examined, and tested in field planting if the heavy investment in them is not to be lost completely. Considerable information has already been gleaned on breeding techniques for forest trees, and some on the nature of inheritance of desirable traits. Of most importance has been the development of rapidly growing hybrids which offer special promise for forest planting. The program for the coming year in genetics will include little more than taking care of the pedigreed plant material on hand, and the working up of scientific results from past studies.

Closely related to developing improved tree types by genetics research is improving the usefulness of existing tree species, especially seedlings for planting stock, by applying physiologic techniques. Studies at Beltsville were designed primarily to increase the survival of seedlings planted on difficult sites, particularly droughty sites. This program has been almost completely absorbed by the camouflage studies mentioned above. However, special attention will be paid to increasing our knowledge of fundamental tree physiology. In part, this program will follow leads developed by the physiologist formerly attached to the genetics work, and in part it will seek out new fields. It is particularly important that special attention be given to determining the types of reactions that growth substances call forth in woody plants, such as increased root growth, delayed top growth, retention of leaves, and the like. Such information will be valuable not only in the camouflage program, but in forest planting programs in the postwar period, in shade tree care, and in actual management of merchantable timber stands.

Forest Pathology (Bureau of Plant Industry)

Fully as important as discovering how wood can be produced abundantly and cheaply are determining how live timber and products made of wood

can be protected against deterioration by wood-destroying fungi and insects. The closing of the Northeastern Station did not materially change the working arrangements in forest pathology. Dr. Spaulding remains in charge and carries on his work in cooperation with Yale University. Studies of decay in living balsam fir have been written up for publication. To avoid heavy losses, it is desirable to manage stands containing a high percentage of balsam on 20-year cutting cycles or less, rather than on cutting cycles adapted to the longer-lived spruce with which it is normally associated. Balsam should not be held beyond 70 or 80 years of age, and trees should be harvested down to an 8-inch diameter limit.

Studies of decay of logging debris have also been completed and a manuscript prepared. These studies indicate that hardwood slash generally disintegrates completely within 15 years, white pine slash in about 18 years, and red spruce slash in about 29 years. Twigs and very small branches are attacked by special fungi which heretofore have been largely overlooked. Moisture content is crucial in slash decay. Following selective cutting, there is usually sufficient shade to keep the slash relatively moist and to favor rapid decay. Clear-cutting, on the other hand, allows the slash to dry out and case harden, thereby delaying decay. At the opposite extreme, slash on wet sites may become waterlogged, thereby delaying decay. This is particularly true of such species as yellow birch. Lopping of slash delays decay where waterlogging is likely to occur.

Fire danger from red spruce slash remains extremely high for 8 years, high from 8 to 12 years, moderate from 12 to 17 years, and low from 17 to 22 years. After 22 years, it is considered safe. Hardwood slash presents an extreme hazard for the first 2 years, high the third year, medium the sixth year, and low at 9 years, and is safe after 15 years. Eastern white pine presents extreme danger for the first 4 years, high from 4 to 7, medium from 7 to 9, low from 9 to 14, and safe thereafter. Slash fungi do not present a disease hazard to natural tree seedlings.

During the past year, considerable attention has been paid to the decay in wooden ships, wooden structures, and wooden airplanes as a service to the various war agencies. Suggestions for avoiding such decay and for arresting it once it starts have been made to the proper authorities.

Forest Entomology (Bureau of Entomology and Plant Quarantine)

America's forests are plagued by a large number of destructive insects, each one of which varies from year to year in population range and the amount of destruction it causes. The task of the forest entomologist, particularly of the research entomologist, is ever varying and never finished. The insects cannot be eradicated, nor is it feasible to control them over wide areas by spraying or other means available to the agriculturists. For the most part, we must learn how to live with them, modifying our cultural techniques in such a way that their damage

is minimized. During the past year in New England and New York, new outbreaks or extension in range were reported for the beech scale and the oak twig pruner. Of these, only the beech scale appears to offer a serious threat, and even this may be subject to control by winter weather. Damage caused by the European spruce sawfly in New England is at a very low level, and also that caused by the gypsy moth. Trees defoliated by the saddled prominent in 1941 are showing excellent recovery and no evidence of an attack occurred in 1942. The red pine sawfly, the LeConte sawfly, and other related species have caused some damage to red pine plantations, but this also has not been excessive.

Attempts to control the gypsy moth by direct means have required a tremendous amount of labor. Efforts to learn more about the habits of the insect in order to work out indirect control methods are therefore of particular importance today. One new fact that may prove quite important in control technique is the relationship between litter depth and the amount of time the larger larvae spend on the ground. Where litter is thin, as in open stands on sandy soils of Maine, New Hampshire, and Massachusetts, the insect spends relatively little time on the ground. Where the forest is dense and the litter layer is thick, the insects remain longer on the ground where they apparently undergo heavy destruction by insect-eating mammals and other ground predators. The extent to which the population can be controlled by control of crown density first, and litter thickness second, remains to be discovered.

One deterrent to developing widespread use of insecticides to control leaf-eating forest insects has been the toxicity to warm-blooded animals of sprays containing arsenicals and lead. Another has been the cost of applying aprays. Attention has therefore been concentrated on developing a spray that is non-toxic to man and warm-blooded animals and which can be ejected from airplanes in a highly concentrated fine spray. Cryolite is effective in controlling the gypsy moth and apparently is non-toxic to livestock. The method of applying this material from aircraft is yet to be perfected.

A development in the field of pure physiology, the significance of which cannot be fully appraised at present, is the relationship between vigor of trees and the voltage gradient in the stem. This technique worked out in the laboratory was applied in the field last year. The field results fully confirmed those laboratory findings that voltage gradients deviated from the normal when trees declined in vigor or when they were subjected to drought. The voltage gradient technique is so sensitive that it can detect a decline in vigor fully a year before the tree becomes subject to attack by bark beetles. A disturbance in normal voltage gradient will not necessarily be followed by the tree's death, because both drought and defoliation disturb voltage gradients but may not result in death.

Throughout 1942, an inspection and advisory service was provided the construction and maintenance divisions of various war agencies in the states covered by the two Stations. Special attention was devoted to

protecting new and old structures, and also materials packed for shipment to various parts of the world, against termites and other wood borers. The importance of this work has resulted in its transfer from the Northeast to Beltsville, where it is being organized as a consulting service to our armed forces. A manuscript, "Chemical impregnation of trees and poles for wood preservation", was prepared for publication.

Status of work in the Northeastern territory

The closing of the Northeastern Forest Experiment Station inevitably left a number of projects hanging in the air. Many of these must remain suspended until after the war. The white pine project had just gotten under way. An excellent experimental area, the Massabesic Forest, was purchased and organized for research work. Sample plots had been established and studies of seed fall started. The Massabesic Forest is one of the most satisfactory areas that could be found in New England for research in white pine, inasmuch as it was undamaged by the hurricane. Aside from work on the experimental forest, a problem analysis had been completed and a survey made of the literature and research under way by other agencies. Two types of work were planned: Detailed experiments on the silvics of white pine, and large scale silvicultural studies involving cuttings of 20 acres and larger. The work at Massabesic was to be closely correlated with studies of the game population of white pine forests and of damaging insects and diseases. This project should be resumed at the earliest possible date after the war, carrying on from the point at which the work was dropped.

The hardwood types in the Adirondacks and New England differ quite significantly from those of the Allegheny Plateau. It is therefore quite important that research work be resumed in the hardwoods of northern New York, Maine, New Hampshire, and Vermont when the war is over. A number of cutting experiments had been installed at the Bartlett Experimental Forest prior to its closing. These involved group selection, tree selection, shelterwood, and clear-cutting. Large groups of sample plots have been installed and should be reexamined as early as possible upon the resumption of research in this territory. Large scale cutting experiments laid out in 1939 and 1940 but not yet cut over are being laid aside indefinitely, but work should be resumed when the war is over.

Spruce research under Westveld's direction has been carried on for the past 17 years. Excellent information is available on the regeneration of the spruce-fir type after cutting, and the results to be expected from cutting and girdling hardwoods overtopping spruce have been evaluated. Growth following pulpwood cuttings has been studied for many years and growth tables compiled. A large number of experiments were under way at the Gale River Station, many of which were destroyed by the hurricane of 1938. For the most part, spruce management studies have passed through the reproduction quadrat-sample plot stage and are now ready for large scale application to work out the economics of cutting methods. When work is resumed, an effort should be made to find a

suitable tract for large-scale operations where the results of small-scale study plots can be put through the pilot plant stage. The rather widespread interest that pulp companies have recently taken in selective cutting of spruce indicates that methods perfected will have ready acceptance by the industry.

A large number of planting experiments have been installed on the Chenango Experimental Forest. These involve planting of both hardwoods and conifers, planting on uplands and wet areas, plantings in mixtures and blocks. Work with conifers for the most part has been satisfactory, and has given rise to a number of plantations that will be available for future studies of growth rate with and without release cuttings. Most of the attempts to plant hardwoods have been failures. If planting research is resumed in the Northeastern territory, special attention should be devoted to the planting of hardwoods. Inasmuch as the Station is devoting considerable attention to planting of hardwoods in connection with its camouflage studies at Beltsville, it seems quite likely that the entire planting project should be reconsidered and reoriented, if and when it is resumed. Considerable valuable information can be anticipated from reexamining the plantations on the Chenango Forest at about five year intervals.

Linking the Present Program to Future Needs

Although the Station's work during the past year has been treated under the three main headings War Projects, Post-war Projects, and Maintenance of Long-term Studies Valuable in the Decades to Come, actually no sharp line of demarcation exists. It is true that the current studies of production and requirements of strategic forest products are mainly useful today, yet the Station in the process of conducting such studies accumulates experience and information that will be extremely useful in planning research programs for the post-war period and in working out the types of forest economy that are most likely to fit the needs of local communities and counties during the era of peace to come.

Census of lumber production is a valuable adjunct to the supplies and requirements surveys and to general studies of economics of wood use. The studies designed to improve the usefulness of woody vegetation for camouflage planting will be of even greater usefulness when large-scale forest planting again becomes possible. Fire studies, production cost studies, timber surveys, forest cooperatives, genetics, tree physiology, and special management studies all have a value in the post-war period as well as today.

In evaluating the Station's program as a whole, it is only fair that in addition to checking accomplishments and plans against war needs, post-war needs, and long-term commitments, it be weighed also against the ultimate goals of all scientific endeavor. Will it lead to better understanding of man's environment? Will it promote intelligent control over man's destiny? Has it an appeal to the common man because of the directness of its objectives and of the devotion with which these objectives are pursued? And finally, does it provide spiritual

satisfaction to its participants and to those acquainted with its achievements? Measured against such standards, many current accomplishments worthy in themselves recede into the background, particularly those aimed at a quick answer to pressing war problems. And new facts still too imperfectly understood to apply as every-day working knowledge grip the imagination as true milestones of progress.

Equally important and equally stimulating are new outlooks on forest problems, and especially new techniques for enlisting the support of our people for action programs that convert research results into human benefits. By renewing our devotion to these high purposes, the Station and its workers can view the turmoil of the day in proper perspective and maintain a firm grip on that inner satisfaction that comes from creative work of enduring human worth.

ALLEGHENY FOREST EXPERIMENT STATION

PERSONNEL - 1942

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Hardy L. Shirley, Director

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Margaret R. Evans, Sr. Clerk
Katherine F. McKeaney, Sr. Stenographer
Josephine Sorrentino, Jr. Clerk Stenographer
Marjorie T. Jackson, Jr. Clerk Stenographer

Field Divisions

Bartlett Experimental Forest, Bartlett, New Hampshire
(In custody of the White Mountain National Forest)

Beltsville Experimental Forest and Laboratory, Laurel, Maryland

T. Ewald Maki, Sr. Forester

Chenango Experimental Forest, Smyrna, New York (Closed)

Eastern Shore Experimental Forest, Parsonsburg, Maryland

Donald B. Blewitt, Agricultural Aid

Finch-Pruyn Experimental Forest, Newcomb, New York (Closed)

Gale River Experimental Forest, Pierce Bridge, New Hampshire
(In custody of White Mountain National Forest)

Kane Experimental Forest, Kane, Pennsylvania

Ashbel F. Hough, Associate Silviculturist

Lawrence Hopkins Memorial Experimental Forest, Williamstown, Mass.

Harold F. Ford, Agricultural Aid

Lebanon Experimental Forest, New Lisbon, New Jersey

Horace A. Somes, Agricultural Aid

Massabesic Experimental Forest, Alfred, Maine (Closed)

Standing Stone Experimental Forest, Manor Hill, Pennsylvania

Ronald A. Bartoo, Agent (Jr. Agricultural Aid)

Field Divisions (Cont'd.)

Cooperstown Forest Cooperative, Cooperstown, New York

Allen W. Bratton, Associate Forest Economist

Anthracite Survey, Wilkes-Barre, Pennsylvania

Bertram C. Goodell, Assistant Forester

Farm Forestry, Connecticut

George R. Trimble, Jr., Assistant Forester

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Forest Management

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Northern Hardwoods

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Duane C. Conley, Jr. Agricultural Aid (4 months)

Oak

Donald D. Stevenson, Collaborator
Ronald A. Bartoo, Agent (Jr. Agricultural Aid)
William V. McConnell, Jr. Agricultural Aid (4 months)

Oak-Pine

Silas Little, Jr., Associate Silviculturist
George R. Fahnestock, Jr. Forester (SST 4/15/42)
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Horace A. Somes, Agricultural Aid
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Farm Forestry

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Regeneration and Camouflage

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T. Ewald Maki, Sr. Forester
Elbert L. Little, Jr., Dendrologist
William E. McQuilkin, Associate Silviculturist
Carl E. Ostrom, Associate Silviculturist
Morris A. Huberman, Associate Silviculturist (Trans. 9/9/42)
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Ralph P. Broomall, Jr. Agricultural Aid
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Cooperstown Forest Cooperative

Allen W. Bratton, Associate Forest Economist
Beatrice F. Kellogg, Asst. Clerk Stenographer
Charles R. Lockard, Forest Economist (Trans. 6/26/42)
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Anthracite Forest Survey

Bertram C. Goodell, Asst. Forester
Reginald D. Forbes, Sr. Forester (SST 11/3/42)
Clement Mesavage, Asst. Forester (Trans. 8/16/42)
Miles J. Ferree, Jr. Forester
Arthur S. Todd, Jr. Forester (Trans. 5/1/42)
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Products Supplies and Requirements and Census of Lumber Production

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Products Supplies and Requirements and Census of Lumber Production
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Frank E. Cunningham, Assistant Forester
Benjamin L. Gyure, Assistant Forester
Richard E. Wilson, Assistant Forester

Special Surveys

Marinus Westveld, Sr. Silviculturist

Flood Control Surveys

Wm. Mollenhauer, Jr., On detail to Bureau of Agricultural Economics (SST 6/25/42)

Harold F. Morey, On detail to the Washington Office (Trans. 8/26/42)

Raymond F. Pierce, On detail to Bureau of Agricultural Economics (SST 4/3/42)

Sidney J. Grossman, On detail to Yazoo Flood Control Survey (Trans. 5/16/42)

Special Studies

Edmond S. Meany, Jr., Agent (Assoc. Information Specialist)

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Westveld, M., Perley Spaulding and J. R. Hansbrough	Balsam Fir — Use it, don't lose it. Tech. Note No. 49.

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O. E. Jennings	Curator of Botany, Carnegie Museum, Pittsburgh, Pa.
Joseph F. Kaylor	State Forester, Department of Forests and Parks, Baltimore, Maryland
Paul Koenig	Vice-President and General Manager, T. H. Glatfelter Company, Spring Grove, Pa.
Louis Krumenacker	Manager, Krumenacker Lumber Company Stoyestown, Pa.
William H. Martin	Director, New Jersey Agricultural Experiment Station, New Brunswick, New Jersey
H. Gleason Mattoon	Secretary, Pennsylvania Forestry Association, Philadelphia, Pa.
Stanley Mesavage	Forester, Wyoming Valley Chamber of Commerce, Wilkes-Barre, Pa.
David W. Robinson	Interstate Commission on the Delaware River Basin, Philadelphia, Pa.
M. B. Saul	Counsel, The Morris Foundation, Morris Arboretum, Philadelphia, Pa.
George L. Schuster	Director, Agricultural Experiment Station, Newark, Delaware
W. S. Taber	State Forester, Dover, Delaware
Ezra B. Whitman	Engineer, Whitman, Requardt and Smith, Baltimore, Maryland
C. P. Wilber	State Forester, Department of Conservation and Development, Trenton, New Jersey
Abel Wolman	Professor Sanitary Engineering, Johns Hopkins University, Baltimore, Maryland

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Hardy L. Shirley, Secretary	Director, Allegheny Forest Experiment Station, Philadelphia, Pa.

PROJECT SHEETS

The project sheets are shown under two groupings this year. First, are the regular project sheets of the Allegheny Station, plus those projects that were taken over from the Northeastern Station. Second, the Northeastern Station projects which have been closed for the duration of the war. It is felt desirable to review the project sheets rather carefully this year, with a view towards setting forth clearly the status of each project at the end of the first year of war. Projects on which no progress is made during the coming year will not be revised for the 1943 Annual Report, unless specifically requested.

RS-AL
SILVICULTURE
Harvest Cuttings

PROJECT STATUS SHEET

January 15, 1943

HARVEST CUTTINGS

FIELD DIVISION: Forest Management Research

WORK PROJECT: Silviculture

LINE PROJECT: Harvest cuttings, beech-birch-maple-hemlock

PURPOSE:

To determine commercially feasible methods of harvesting timber that will prolong the cutting period, gradually increase the quality of timber, perpetuate desirable species, and return high total yields.

REVIEW OF PAST WORK:

Mature stands containing advanced growth of desirable species can be clear cut with reasonable assurance that a good stand will follow, but clear cutting over large areas in immature second growth involves high risk that the third growth will be dominated by pin cherry and multiple stemmed, decay susceptible stump sprouts. Partial cutting of sawlogs on a 10 or 20 year cutting cycle offers many advantages over removing all stems to a minimum size at once. Studies of past commercial operations show current annual volume increment to be highly correlated with the amount of growing stock, 10 inches d.b.h. and larger, left after the original logging. Yields after partial cutting increased with amount of growing stock left. Mixed stands of black cherry-sugar maple second growth, which followed past partial cuttings, are generally rapid growing; sawlogs of cherry may be cut at 60 - 70 years, the sugar maple will then grow 400 or more board feet per acre per year until the stand is again partially cut at 100-120 years of age. Pulpwood per unit volume of solid wood produced from trees 5 to 8 inches in diameter requires 90 percent more labor than that produced from trees 11 inches and larger; in stands 60 years of age, the latter cutting leaves growing stock adequate to produce another harvest cutting within 10 - 15 years.

ACCOMPLISHMENTS DURING PAST YEAR:

Manuscript for chemicalwood production time studies prepared for publication. Results show it takes twice as much time to cut a cord of wood from 4-inch trees as from 12-inch trees. Leaving all trees below 7" d.b.h. resulted in a saving of 10% in time per cord and 19% in time per cubic foot of wood cut. Pole skidding for distances of 600' or less is cheaper and more efficient than stump piling and draying. At the same time the cutter is encouraged to leave the smaller trees thus providing a better growing stock. Partial cutting of sawtimber concentrated on the larger sized trees is less expensive as to log making and woods road construction. Skidding costs did not differ significantly. Less damage was caused to the reserved stand by light than fairly heavy partial cuttings.

PLANS FOR NEXT YEAR:

A mine prop production time study is planned for western Maryland in cooperation with the Maryland Department of Forests and Parks. Cost and silvicultural studies of harvest cutting methods in second growth stands approaching maturity will be continued.

DATE OF COMPLETION: Indefinite

ASSIGNMENT: Hough

RS-AL
SILVICULTURE
Harvest Cuttings

PROJECT STATUS SHEET

January 15, 1943

HARVEST CUTTINGS

FIELD DIVISION: Forest Management Research

WORK PROJECT: Silviculture

LINE PROJECT: Harvest cuttings, oak-pine (New Jersey and Maryland)

PURPOSE:

To develop practical methods of harvesting oak-pine stands that will result in high yields of the most valuable products, and ensure adequate seedling reproduction with a high percentage of pine.

REVIEW OF PAST WORK:

In 1940, 56 plots were established in two types of oak-pine stands to test the use of seed tree cuttings followed by various types of brush disposal and soil scarification as methods of getting natural seedling reproduction of pine. Apparent seed crop failure caused 28 plots to be ineffective in their first year. Initial measurement of the other 28 plots showed up to 80% stocking by new seedlings, with 87% occurring on mineral soil. In 1941 a cutting experiment in 54-year-old loblolly pine was started to compare the economic returns and yield from harvesting piling and sawlogs on 5-and 10-year cutting cycles and with clear cutting. Problem analyses were prepared for the oak-pine type in Maryland, Delaware, and in New Jersey.

ACCOMPLISHMENTS DURING PAST YEAR:

Twenty-eight plots that failed to reproduce through lack of seed supply were artificially seeded at screened and unscreened spots. Stocking of these was in general unsatisfactory, averaging on the treated plots only 27% on protected spots and less than 16% on unprotected ones. Natural reproduction on these plots, however, is beginning to show up, and on plots where oak sprouts have annually been cut back will be satisfactory. The importance of cleanings on these blocks varies. Cutting of piling and sawlogs was completed on the loblolly pine study. Logging costs were cheaper per M on a 25% cut than on either clear cutting or on a 10% cut. Stumpage returns were highest per M on the clear cut and lowest on the 25% cut. The differences, however, are probably not significant.

PLANS FOR NEXT YEAR:

Prepare progress report on results to date. On loblolly pine cutting study write establishment report, complete analysis and prepare article on logging cost study.

DATE OF COMPLETION: Indefinite

ASSIGNMENT: Schnur, Little, Somes

RS-AL
SILVICULTURE
Harvest Cuttings

PROJECT STATUS SHEET

January 15, 1943

HARVEST CUTTINGS

FIELD DIVISION: Forest Management Research

WORK PROJECT: Silviculture

LINE PROJECT: Harvest cuttings, oak

PURPOSE:

To develop practical methods of harvesting stands that will yield large volumes of high grade timber and result in prompt restocking with desirable seedlings.

REVIEW OF PAST WORK:

Permanent growth plots in uncut timber have been maintained for many years by the Pennsylvania Bureau of Forestry. Exploratory studies have been undertaken in woodlots of Pennsylvania State College.

ACCOMPLISHMENTS DURING PAST YEAR:

Three cutting experiments were established last year, one in a 50-year old white pine stand having many poorly-formed dominants; a second in a Virginia pine stand 40 to 50 years of age that was cut to approximately a 9-inch diameter limit, and the third in an uneven-aged stand composed of 25 to 50-year old Virginia pine having a large number of wolf trees. Detailed cost records were kept to determine the feasibility of the work. Results of this study have not yet been analyzed.

PLANS FOR NEXT YEAR:

Study plots already initiated will be completed, a timber inventory of the experimental forest will be completed, and a management plan prepared. New harvest cutting experiments in Virginia pine will be undertaken if circumstances permit.

DATE OF COMPLETION:

Indefinite

ASSIGNMENT:

Stevenson and Bartoo

RS-AL
SILVICULTURE
Stand Improvement

PROJECT STATUS SHEET

January 15, 1943

STAND IMPROVEMENT

FIELD DIVISION: Forest Management Research

WORK PROJECT: Silviculture

LINE PROJECT: Stand improvement, beech-birch-maple-hemlock

PURPOSE:

To determine the extent to which large areas of second growth northern hardwood forest can be improved in composition, growth rate, and quality by practical stand treatments.

REVIEW OF PAST WORK:

Commercial thinning for chemical wood can be made in well-stocked stands of 30 - 40 years of age, removing between 5 and 10 cords per acre. If the trees left are skillfully selected and properly spaced, a rapidly growing stand that will produce high quality saw timber results. Heavy thinning at this age introduces the hazards of understocking, high inflammability, glaze injury, wind breakage, sunscald, and epicormic branching; it also increases the proportion of sprouts to seedlings. Understocking and a high proportion of multiple stemmed sprouts are the most common and serious obstacles to high quality saw timber production from second and third growth forests. Decay hazard from multiple stem sprouts can be largely eliminated by desprouting stumps or by weeding or thinning if done before stands reach 20 years of age. The extent to which such work will repay its cost is yet to be determined. Other stand improvement measures to reduce disease hazards in second growth have been outlined in Occasional Paper 5. Large scale thinnings for chemical and pulpwood have been begun on Allegheny National Forest and Armstrong Forest Company lands to test further the techniques developed on small scale studies.

ACCOMPLISHMENTS DURING PAST YEAR:

Weeding studies have shown crop trees of all crown classes respond well to release and most are still free to grow 5 years after treatment. Diameter growth was stimulated by weeding, moderate to heavy removal of basal area being most effective in increasing crop tree growth. Partial cuttings of pulpwood using the 8" and 11" d.b.h. limits, show good initial recovery. Thinning study remeasurements indicate conservative removal of cordwood in young stands increases growth 20 percent on average sites in this region.

PLANS FOR NEXT YEAR:

No new work will be done on this project during war period. Existing data on weedings and thinnings will be published.

DATE OF COMPLETION: Indefinite

ASSIGNMENT: Hough

RS-AL
SILVICULTURE
Stand Improvement

PROJECT STATUS SHEET

January 15, 1943

STAND IMPROVEMENT

FIELD DIVISION: Forest Management Research

WORK PROJECT: Silviculture

LINE PROJECT: Stand improvement, oak-pine type of Coastal Plain

PURPOSE:

To develop practical methods by which the composition, growth and quality of immature stands can be improved.

REVIEW OF PAST WORK:

Dense, stagnant old-field Virginia pine should be thinned at about 10, 16 and 25 years of age, reducing stand to 700 trees per acre in last thinning. White pine 6 x 6 plantation should be thinned at 15 to 20 years of age; pruned before 25 years. Loblolly pine responds well to thinnings at 23 and 30 years of age, removing trees that would die within 10 to 15 years.

ACCOMPLISHMENTS DURING PAST YEAR:

Reported progress and revised work plan for oak-pine thinning plots in New Jersey. Seed dispersal studies on isolated white cedars showed seed catch predominantly on northeast, east or southeast side of trees. Best height growth of 2 - 0 planted cedars in hardwood swamps occurred when released from overwood and brush, averaging four times that on swamp control and double of best treatment average on St. Johns sites. Many bore mature cones at end of first field season. Light intensities of 1% to 2% of full sunlight in swamp control plots showed lowest stocking of seeded spots and smallest growth of seedlings as contrasted to clear cut plots with light intensities of 75 to 80%. St. Johns sites must be scalped for seeding but not for planting. Deer and rabbit damage more common on swamp plots than on St. Johns plots. Thinning study in 9-year old thicket of old-field loblolly pine on Eastern Shore initiated.

PLANS FOR NEXT YEAR:

Postpone 1943 remeasurement of Virginia pine plots until after war. Maintain other plots on Eastern Shore. Remeasurement of New Jersey plots if war work permits.

DATE OF COMPLETION:

Indefinite

ASSIGNMENT:

Schnur, Little and Somes

RS-AL
SILVICULTURE
Silvics

PROJECT STATUS SHEET

January 15, 1943

SILVICS

FIELD DIVISION: Forest Management Research

WORK PROJECT: Silviculture

LINE PROJECT: Silvics, beech-birch-maple-hemlock

PURPOSE:

To determine the silvical characteristics of species and the ecology of stands, as the bases for silvicultural practices.

REVIEW OF PAST WORK:

Drought, glaze, frost, fire and wind, within the general climatic region of the Allegheny Plateau, cause widespread losses in mature stands and young growth. Topography, aspect on steep slopes, and soil drainage, are major factors influencing species composition and growth in second growth stands. Great diurnal and seasonal temperature extremes occur in "frost pockets", areas on low ground cleared by fires or cutting that are slow to reproduce even when fenced to exclude deer and rabbits. Similar low areas covered with high forest do not show "frost pocket" conditions. Life histories of stands show that the desirable white pine, hemlock, black cherry, white ash, yellow poplar, and basswood, as well as the less desirable birches and red maple, become established following such catastrophes as windthrow, drought, or fire. Heavy cuttings in the original forest increase the abundance of black cherry, red maple, and sweet birch; light cuttings favor tolerant sugar maple, beech, hemlock, and yellow birch. Ability to persist under suppression and rapid sustained growth when released are outstanding silvical characteristics of the tolerant species.

Topography, aspect, light, soil moisture, duff temperature, and seedbed conditions affect the germination and first year survival of hemlock. Steep north and west slopes are most favorable. At low light intensities root growth is poor and may result in death from drought during certain seasons. Better first year survival and growth occurred in 31% than in 4, 11, 67, or 100% light intensity. Rabbits may be a major factor in reducing the abundance of tree reproduction. Fencing to exclude deer increased tree reproduction 4 - 13%, while protection from both deer and rabbits resulted in 230 - 300% increase in the reproduction on plateau and lower slope sites.

ACCOMPLISHMENTS DURING PAST YEAR:

Submitted three manuscripts for publication. (See publications).

PLANS FOR NEXT YEAR:

Observations on the reproduction of other species after various degrees of thinning and harvest cutting will be made as war work permits.

DATE OF COMPLETION: Indefinite

ASSIGNMENT: Hough

RS-AL
SILVICULTURE
Silvics

PROJECT STATUS SHEET

January 15, 1943

SILVICS

FIELD DIVISION: Forest Management Research

WORK PROJECT: Silviculture

LINE PROJECT: Silvics, oak-pine

PURPOSE:

To determine, as the basis for silvicultural practices, the ecology of stands and the silvical characters of the principal species, including the effect of environmental factors on natural regeneration by seed or sprout.

REVIEW OF PAST WORK:

Seed production of oak; seed dispersal of pine and Atlantic white-cedar; the effect of site, animals, insects, and seedbed on reproduction in the oak-pine type; relation between leaf area and root system of sprouts and those of parent tree; vigor of sprouting by species of oak; and phenological observations, have been studied and reported in 18 technical notes and papers in various journals. As a basis for white-cedar management, a study of the lowland sites in southern New Jersey was initiated in 1940 to determine the successional stages and climax and the factors controlling succession. Mature white-cedar stands disperse some 8½ million seeds per acre per year; shortleaf and pitch pine, 3,000 to 300,000. Progress report on lowland succession completed and laboratory work to determine germinating conditions for white-cedar started in 1941.

ACCOMPLISHMENTS DURING PAST YEAR:

Light measurements under various swamp stands show that near ground level, the following light intensities -- in terms of full sunlight -- exist: old cranberry bogs, 40%; hardwood and cedar reproduction, 8% to 20%; sapling-pole to mature cedar, or mixed stands, 4% to 7%; and hardwood sapling-pole or larger stands, generally 1% to 2%. Greenhouse experiment started using seedlings of three swamp species under three light intensities and three water table conditions.

PLANS FOR NEXT YEAR:

Complete report on progress to date. If war work allows, complete study since only minor phases remain unfinished.

DATE OF COMPLETION:

1944

ASSIGNMENT:

Little

RS-AL
SILVICULTURE
Silvics

PROJECT STATUS SHEET

January 15, 1943

SILVICS

FIELD DIVISION: Forest Management Research

WORK PROJECT: Silviculture

LINE PROJECT: Silvics, oak type

PURPOSE:

To determine the silvical characteristics of species and the ecology of stands, as a basis for silvicultural practices.

REVIEW OF PAST WORK:

New project.

ACCOMPLISHMENTS DURING PAST YEAR:

A preliminary study was made of the plants growing in Virginia pine stands on various site classes, and tentative plant indicators determined. These require checking by further studies before being announced for use. A preliminary study of the relationship between oak seedlings, aspect, and depth of litter show seedlings to be more numerous on north and east slopes where the litter is thicker. Apparently, litter depth is greater on slopes protected against the hot afternoon sun.

PLANS FOR NEXT YEAR:

The oak seedling study will be continued. The study of plant indicators will be postponed indefinitely because Bramble, who has been in charge of this work, has gone to the Army.

DATE OF COMPLETION:

Indefinite

ASSIGNMENT:

Stevenson and Bartoo

RS-AL
SILVICULTURE
Silvics
Soils - fertilizers

PROJECT STATUS SHEET

January 15, 1943

FOREST MANAGEMENT, FUNDAMENTAL STUDIES

FIELD DIVISION: Forest Management Research

WORK PROJECT: Silviculture

LINE PROJECT: Silvics, soils - fertilizers

PURPOSE:

To discover fertilizing regimens that will (1) increase growth rate and luxuriance of foliage in trees useful for soil stabilization and camouflage planting; (2) restore vigor to injured trees.

REVIEW OF PAST WORK:

New project, undertaken at the request of Engineer Board, U. S. Army.

ACCOMPLISHMENTS DURING PAST YEAR:

A red and white pine plantation was treated with high and low levels nitrogen, phosphorous and potash, individually and in combinations with sawdust mulching and scalping treatments. Injured trees at Fort Belvoir were treated with special fertilizers and growth regulators. Review of tree fertilizing practices was begun.

PLANS FOR NEXT YEAR:

Study of fertilizer technique will be initiated, in cooperation with the Division of Soil Chemistry and Physics. Compendium on tree fertilizing will be prepared. New tests in plantations will be started.

DATE OF COMPLETION:

Indefinite

ASSIGNMENT:

Forest Service: Maki, McQuilkin, Ostrom, and CPS assistants.

RS-AL
SILVICULTURE
Silvics
Wound healing

PROJECT STATUS SHEET

January 15, 1943

FOREST MANAGEMENT, FUNDAMENTAL STUDIES

FIELD DIVISION: Forest Management Research

WORK PROJECT: Silviculture

LINE PROJECT: Silvics, wound healing

PURPOSE:

To determine methods of hastening healing of tree wounds through use of growth regulators and nutrients.

REVIEW OF PAST WORK:

New project, undertaken at the request of the Army Engineers.

ACCOMPLISHMENTS DURING PAST YEAR:

A major wound healing study was undertaken, involving 7 species and 3 seasons of wounding, 13 growth regulators, and other chemical treatments in both lanolin and shellac carriers on shaded and unshaded boles. A smaller study involving tests of growth regulators and standard dressings in fall and spring applications, with and without fertilizers, was installed in the fall of 1942. A special study to determine the relation between intensity of wounding and healing, and type of wound and wound healing was undertaken.

PLANS FOR NEXT YEAR:

Additional wounding treatments will be carried on during next year, and existing experiments followed up closely.

DATE OF COMPLETION:

Indefinite

ASSIGNMENT:

Forest Service: Maki and CPS assistants.
Bureau of Plant Industry: Hamner

RS-AL
MENSURATION
Stand Studies

PROJECT STATUS SHEET

January 15, 1943

STAND DEVELOPMENT, GROWTH, AND YIELD

FIELD DIVISION: Forest Management Research

WORK PROJECT: Mensuration

LINE PROJECT: Stand studies and tree studies - oak and loblolly pine

PURPOSE:

To determine the growth and yield of stands, and to analyze the factors governing growth and development as a basis for sound forest management.

REVIEW OF PAST WORK:

Growth and development studies of loblolly pine were begun by the Forest Service in Maryland in 1906 and maintained in cooperation with the Maryland State Department of Forestry. Results of past studies were published in one Maryland State Bulletin and two Journal of Agricultural Research articles. Average growth on 22,155 acres of merchantable and pine pole stands in Worcester County, Maryland, was found to be 360 board feet per acre per year. Mean annual diameter growth of 0.16-0.18 and 0.10-0.15 inches for pines and hardwoods respectively were found. Average mortality in 5 years for loblolly pine was found to be 42% for 2-inch trees, 9% for 8-inch, 1% for 12-inch, and 0% for all trees above 16 inches. Volume tables for loblolly pine are available in Technical Note #25. Volume and yield tables for oak were published in USDA Technical Bulletin 560.

ACCOMPLISHMENTS DURING PAST YEAR:

Volume measurements were obtained on 50 loblolly pine trees.

PLANS FOR NEXT YEAR:

Maintain loblolly pine plots.

DATE OF COMPLETION:

Indefinite

ASSIGNMENT:

Schnur

RS-AL-NE
MENSURATION
Stand Studies
(ME-2)

PROJECT STATUS SHEET

January 15, 1943

STAND DEVELOPMENT, GROWTH, & YIELD

FIELD DIVISION: Forest Management

WORK PROJECT: Mensuration

LINE PROJECT: Stand study - spruce and fir growth and yield

PURPOSE:

To prepare normal yield tables for even-aged second-growth stands of red spruce, pure and in mixture with balsam fir, to determine the approach to normality of understocked stands; to provide a basis for prediction of growth of spruce and fir on cut-over lands; and to prepare tables of growth which will be applicable over the whole spruce region of the Northeast.

REVIEW OF PAST WORK:

U.S.D.A. Bulletin No. 142 was published in 1929, giving tables of yield for fully stocked, even-aged, second-growth stands of spruce and fir. Eighteen sample plots were maintained in New Hampshire and Vermont to check these tables and to provide information on mortality, change in composition and rate at which understocked stands approach normality. Six additional plots were abandoned because of hurricane damage. A special analysis of growth in northern Vermont and New Hampshire was made in 1936 for the Coos-Essex cooperative sustained-yield project. Data from some 400 plots on cut-over lands have been analyzed statistically to derive a mathematical expression for the volume of spruce and fir on cut-over lands, as a function of time since cutting, density (as indicated by the relation between number of trees and their average diameter), and composition (as indicated by the proportion of the total number of trees represented by spruce and fir).

Remeasurement of 16 plots, added to previous work, formed the basis for issuing spruce-fir yield tables in 1941, one set for dominant softwood sites, another for secondary softwood sites.

ACCOMPLISHMENTS DURING PAST YEAR:

Manuscript for bulletin partly completed

PLANS FOR NEXT YEAR: An attempt will be made to complete manuscript.

DATE OF COMPLETION: 1943

ASSIGNMENT: M. Westveld

RS-AL
REGENERATION
Planting

PROJECT STATUS SHEET

January 15, 1943

FOREST PLANTING

FIELD DIVISION: Forest Management Research

WORK PROJECT: Regeneration

LINE PROJECT: Planting

PURPOSE:

To devise planting techniques insuring high survival, rapid growth and best quality of plantations.

REVIEW OF PAST WORK:

Preliminary results published on interplanting conifers in southern New Jersey oak coppice. Species best adapted to various types indicating study of several hundred three to ten-year old plantations. Planting methods and species adaptation tests started in 1938. Published suggestions for improved methods of shipping, heeling-in and handling older plantations in northwestern Pennsylvania in cooperation with Department of Forests and Waters.

ACCOMPLISHMENTS DURING PAST YEAR:

Test plantings indicate black locust most successful on dry, difficult sites subject to grazing. Grading planting stock, using only largest trees, results in less damage by frost heaving and better survival and height growth, and in the case of hardwoods less damage by frost. White spruce planted under a light cover of aspen and pin cherry grew faster than those planted in the open.

PLANS FOR NEXT YEAR:

Subject to war work. Preparation of manuscript on northwest Pennsylvania test plantations and New Jersey inter-planting.

DATE OF COMPLETION:

Indefinite

ASSIGNMENT:

Hough and Little

RS-AL
REGENERATION
Planting
Large Transplant
Treatments

PROJECT STATUS SHEETS

January 15, 1943

FOREST MANAGEMENT, FUNDAMENTAL STUDIES

FIELD DIVISION: Forest Management Research

WORK PROJECT: Regeneration

LINE PROJECT: Planting, large transplants

PURPOSE:

To improve the survival and growth of large transplants by treatment with growth regulators and nutrients, and to prepare recommendations to guide Army Engineers in camouflage plantings.

REVIEW OF PAST WORK:

New project, requested by Engineer Board, U. S. Army.

ACCOMPLISHMENTS DURING THE PAST YEAR:

Pertinent literature was reviewed. A manual on planting trees and shrubs prepared in cooperation with the BPI for use by Army Engineers. Large transplants of 4 species were treated with naphthaline acetic acid by top sprays, root soaking, and root dusting prior to setting out in mid-August. Balled and burlapped stock was tested in contrast to bare root stock. Stock in the nursery was treated with various combinations of growth regulators and potassium fertilizer for field planting in the late spring of 1943. Special tests were made to determine whether or not treatment with growth regulators would reduce injury from salt spray.

PLANS FOR NEXT YEAR:

Experiments started will be carried through to completion and new ones undertaken to follow up on the leads developed.

DATE OF COMPLETION:

Indefinite

ASSIGNMENT:

Forest Service: Maki, McQuilkin, CPS assistants
Bureau of Plant Industry: Hamner and Marth

RS-AL
REGENERATION
Planting

PROJECT STATUS SHEET

January 15, 1943

FOREST MANAGEMENT, FUNDAMENTAL STUDIES

FIELD DIVISION: Forest Management Research

WORK PROJECT: Regeneration

LINE PROJECT: Planting, small stock treatments

PURPOSE:

To improve drought hardiness, field survival, and field growth of forest planting stock through treatment with growth regulators and various nutrient regimens.

REVIEW OF PAST WORK:

New projects undertaken in cooperation with the Bureau of Plant Industry at the request of the Engineer Board, U. S. Army, to furnish information on camouflage planting techniques.

ACCOMPLISHMENTS DURING PAST YEAR:

Preliminary treatment of 21 tree species and 6 shrubs with indole-butyric acid in five different concentrations was made to determine general reactions. Plants with tops sprayed and soaked in solutions of growth regulators were tested for drought resistance in the laboratory, and for transpiration loss, winter kill, and other effects. Treatment of seedlings in seed beds with growth regulators and with potassium fertilizers was carried out. Stock in seed beds were also treated with special fertilizer containing growth regulators.

PLANS FOR NEXT YEAR:

Laboratory and field tests will be continued on plants subjected to various fertilizer regimens and to treatments with various growth substances. Progress reports will be prepared on all phases warranting summaries.

DATE OF COMPLETION:

Indefinite

ASSIGNMENT:

Forest Service: Maki, Ostrom, and CPS assistants.
Bureau of Plant Industry: Hamner and Marth

RS-AL
REGENERATION
Planting
Stock storage

PROJECT STATUS SHEET

January 15, 1943

FOREST MANAGEMENT, FUNDAMENTAL STUDIES

FIELD DIVISION: Forest Management Research

WORK PROJECT: Regeneration

LINE PROJECT: Planting, stock storage

PURPOSE:

To lengthen the time planting stock may be successfully stored prior to out-planting.

REVIEW OF PAST WORK:

New project, requested by Engineer Board, U. S. Army.

ACCOMPLISHMENTS DURING PAST YEAR:

Literature on storage techniques reviewed. Storage tests of small stock were initiated, employing mixtures of growth regulators applied to plants in both vapor and spray forms. Plants stored at air temperature and in cold rooms.

PLANS FOR NEXT YEAR:

Field plantings of stored stock will be carried out to determine the effects of the various treatments. Special tests will be made to determine the possibility of conditioning stock through special short period warm storage.

DATE OF COMPLETION:

Indefinite

ASSIGNMENT:

Forest Service: Maki, Ostrom, McQuilkin, and CPS assistants.
Bureau of Plant Industry: Hamner and Marth

RS-AL
REGENERATION
Nursery Studies
Seedbeds

PROJECT STATUS SHEET

January 15, 1943

FOREST MANAGEMENT, FUNDAMENTAL STUDIES

FIELD DIVISION: Forest Management Research

WORK PROJECT: Regeneration

LINE PROJECT: Nursery, seedbed mulches

PURPOSE:

To determine the effect of chemicals used to preserve cloth seedbed mulches on germinating seed.

REVIEW OF PAST WORK:

New project.

ACCOMPLISHMENTS DURING PAST YEAR:

Mulching cloth treated with 12 different chemicals to prolong its usefulness was tested in 5 different nurseries, to determine the effect of the chemicals on germinated seed. A study of organic mulches and soil amendments in conifer and hardwood beds was installed.

PLANS FOR NEXT YEAR:

Strength tests will be made on treated cloth after one year's use in the nursery. Special tests on the toxicity of cloth to seedlings will be made. Experiments under way will be continued.

DATE OF COMPLETION:

Preservative phase - 1946. Others - indefinite.

ASSIGNMENT:

Forest Service: Maki, McQuilkin, Ostrom, CPS assistants.
Bureau of Home Economics: Furry.

RS-AL
GENETICS
Racial Variation

PROJECT STATUS SHEET

January 15, 1943

RACIAL VARIATION

FIELD DIVISION: Forest Management Research

WORK PROJECT: Forest Genetics

LINE PROJECT: Racial Variation - seed source investigation

PURPOSE:

To determine the effect of geographic origin, seed density, and degree of seed maturity, on seed quality, drought hardiness of seedlings, and general utility of strain for forest planting in the Allegheny territory.

REVIEW OF PAST WORK:

Red pine transplants from 50 seed sources in 9 climatic regions from New England to the Lake States were planted in 1937 at Kane, Pa. Seed of pine from several localities was collected at different stages of maturity and sown in an experimental nursery for subsequent tests of drought hardiness. Special tests of the relationship between seed density and seedling vigor were undertaken. Cooperative tests started in 1938 on red and white pine from Ontario showed no difference due to seed source after 3 years growth. The identity of the lots has been lost and the experiment discontinued. Fourteen seed lots of Norway spruce of various European origins were planted at the Hopkins Forest in 1940. Racial differences were apparent at the end of the second year.

ACCOMPLISHMENTS DURING PAST YEAR:

Project largely on a maintenance basis, though several collections of loblolly pine were sown in the nursery last spring. After five years in the field, no large differences are apparent in survival or growth rate of the red pine seedlings from the nine climatic regions.

PLANS FOR NEXT YEAR:

Seed source material in the experimental nursery will be subjected to drought tests in the laboratory. Tests will be made to determine the effect of wetting agents on imbibition of water by seed.

DATE OF COMPLETION: Indefinite

ASSIGNMENT: Maki, Schreiner, and Hough

RS-AL
GENETICS
Breeding

PROJECT STATUS SHEET

January 15, 1943

FIELD TESTS - NEW HYBRID POPLARS

FIELD DIVISION: Forest Management

WORK PROJECT: Forest Genetics

LINE PROJECT: Breeding - Oxford hybrid poplars

PURPOSE:

To determine the adaptability of the Oxford hybrid poplars throughout the United States.

REVIEW OF PAST WORK:

Cuttings of 58 selected hybrid clones have been distributed to 25 cooperating Forest Service, Soil Conservation Service, Bureau of Plant Industry, and state nurseries throughout the United States. Cuttings have also been sent to government agencies in South America. It is apparent from these cooperative nursery tests that the growth and development of a hybrid in any particular region cannot be predicted but must be based upon actual field tests in that region. Some cooperators have used those hybrids which appeared to be the best for their region in plantation tests.

ACCOMPLISHMENTS DURING PAST YEAR:

No work during 1942.

PLANS FOR NEXT YEAR:

A limited supply of cuttings of the selected hybrid clones will be available this winter for use on camouflage work next spring if an opportunity for such use can be found. No other work is planned during 1943.

DATE OF COMPLETION:

Final conclusions should be based on data from 10- to 15-year old plantations.

ASSIGNMENT:

E. J. Schreiner

RS-AL
GENETICS
Breeding

PROJECT STATUS SHEET

January 15, 1943

BREEDING AND INHERITANCE - FOREST TREES

FIELD DIVISION: Forest Management

WORK PROJECT: Forest Genetics

LINE PROJECT: Breeding and inheritance

PURPOSE:

Controlled breeding for the production of improved forest trees and for information on inheritance in forest-tree species.

REVIEW OF PAST WORK:

A total of 21,600 seedlings resulting from controlled pollinations on Acer, Betula, Fagus, Fraxinus, Liquidambar, Liriodendron, Magnolia, Picea, Pinus, Populus, Quercus, Tilia, Tsuga, and Ulmus are now growing at the Hopkins Memorial Forest. The breeding work has produced evidence for the occurrence of dichogamy in many forest species and self-incompatability in individual trees. In Betula species, some viable seed is produced without pollination (apomixis).

The F_2 Populus hybrids (some 6-species hybrids) already show wide morphological and physiological variation.

Close pollination on three species of Ulmus have indicated some degree of self-fertility.

ACCOMPLISHMENTS DURING PAST YEAR:

Flowering branches of the Oxford hybrids collected last winter were used for controlled breeding (in the greenhouse) in 1942. Three species of Ulmus were self-pollinated. No other breeding work was undertaken.

PLANS FOR NEXT YEAR:

No controlled breeding work is planned for 1943. This line project will be limited to maintenance and study of progenies now in the nursery. Nursery stock will be moved from Williamstown to Beltsville. Small seedlings in pots will be set out in transplant beds at Philadelphia.

DATE OF COMPLETION:

Controlled breeding should be continued when conditions permit.

ASSIGNMENT:

E. J. Schreiner and H. F. Ford

RS - AL
GENETICS
Physiology

PROJECT STATUS SHEET

January 15, 1943

PHYSIOLOGY - REPRODUCTION IN FOREST TREES

FIELD DIVISION: Forest Management

WORK PROJECT: Forest Genetics

LINE PROJECT: Physiological aspects of reproduction in forest trees

PURPOSE:

To obtain information on the physiological phases of reproduction essential to research in heredity and variation.

REVIEW OF PAST WORK:

Storage methods found suitable for red and white pine pollen have been applied with reasonable success to the storage of certain hardwood pollens and to spruce pollen. Experiments on storage of hardwood pollen in inert gases and at reduced pressure have been set up, but not yet completed. Red and white pine pollen has been found more than 80 percent germinable after 30 months' storage at 4°C. and 50 percent relative humidity.

ACCOMPLISHMENTS DURING PAST YEAR:

No work during 1942

PLANS FOR NEXT YEAR:

No new storage tests will be started. Germination tests will be made on pollen now in storage (if time is available) to determine the maximum storage period.

DATE OF COMPLETION:

To be continued until pollen now in storage is no longer available.

ASSIGNMENT:

E. J. Schreiner and H. F. Ford

RS-AL
GENETICS
Physiology

PROJECT STATUS SHEET

January 15, 1943

PHYSIOLOGY - CLONAL PROPAGATION OF FOREST TREES

FIELD DIVISION: Forest Management

WORK PROJECT: Forest Genetics

LINE PROJECT: Clonal propagation

PURPOSE:

To develop economically feasible methods for clonal propagation of important forest-tree types.

REVIEW OF PAST WORK:

The following factors have been found to exert a considerable influence on the rooting of cuttings of forest-tree species; (1) optimum auxin treatment, (2) type of outdoor propagating bed, (3) age and position on tree from which cuttings are taken, and (4) clonal variation, ranging from 18 to 98 percent for red maple. Optimum conditions and treatments have resulted in the following rooting percentages: Sugar maple - 80%, red maple - 70%, aspen - 60%, white birch - 50%, basswood - 25%, and white pine - 50%. The variation in rooting ability of 16 red maple clones (one-half male and one-half female) was from 8 percent to 94 percent; the males rooting to a greater extent, on an average, than the females. By growing sugar maple cuttings in sash beds with horse manure below the rooting medium greenwood cuttings from old trees (60+ years) were rooted up to about 40 percent for cuttings of a current season's growth only, and 20 percent when older wood was at the base.

ACCOMPLISHMENTS DURING PAST YEAR:

Mr. Snow was transferred to the Southern Station early in 1942.

Under the supervision of E. J. Schreiner, L. J. Edgerton (member of C.P.S. on detailed service at Hopkins) carried out an experiment to check Snow's findings during 1941 that cuttings from male trees of red maple root to a greater extent than those from female trees. The results of the 1942 work (on the same trees used in 1941) indicate that rooting is correlated with the amount of fruit produced rather than with the sex of the tree. Heavy fruiting lowers the rooting ability.

PLANS FOR NEXT YEAR:

No work planned for 1943 unless necessitated by camouflage requirements.

DATE OF COMPLETION:

Completed for the duration unless special need arises

ASSIGNMENT: E. J. Schreiner

RS-AL
GENETICS
Cytology

PROJECT STATUS SHEET

January 15, 1943

CYTOLOGY - CHROMOSOME INVESTIGATIONS WITH FOREST TREES

FIELD DIVISION: Forest Management

WORK PROJECT: Forest Genetics

LINE PROJECT: Chromosome investigations with forest trees

PURPOSE:

Determination of the chromosome number of species and individual trees used in breeding.

REVIEW OF PAST WORK:

A chromosome number reconnaissance of Quercus species of potential use in breeding has been completed. Chromosome number determinations have been made in several species of Acer, A genus in which polyploidy occurs. Study of Acer rubrum material collected by Southern and Lake States Stations showed that trees in Mississippi and Michigan have 78 chromosomes in somatic tissue, while a tree used for breeding in New Haven has 104 chromosomes.

ACCOMPLISHMENTS DURING PAST YEAR:

No work on this line project. Mr. Duffield was called for military duty early in 1942.

PLANS FOR NEXT YEAR:

No work planned for 1943.

DATE OF COMPLETION:

Completed for the duration

ASSIGNMENT:

None

RS-AL
GENETICS
Cytology

PROJECT STATUS SHEET

January 15, 1943

CYTOLOGY - REPRODUCTION IN FOREST TREES

FIELD DIVISION: Forest Management

WORK PROJECT: Forest Genetics

LINE PROJECT: Cytological aspects of reproduction in forest trees.

PURPOSE:

To obtain information on the cytological phases of reproduction essential to research in heredity and variation.

REVIEW OF PAST WORK:

Apomictic seed has been found in about 2 percent of non-pollinated fruits of Betula papyrifera, and the chronology of embryo development in this species and in B. lutea has been outlined. Considerable individual tree variation in seed filling was found in Betula populifolia, and material was collected for a study of individual tree variation (in apomixis) in this species. Cytological studies of seed formation in fertile and sterile pistillate trees of Acer rubrum have been started with a view to determining the cause of sterility of certain trees. Results to date suggest that pollen-tube incompatibilities are not a significant factor in this case.

ACCOMPLISHMENTS DURING PAST YEAR:

No work on this line project. Mr. Duffield was called for military duty early in 1943.

PLANS FOR NEXT YEAR:

No work planned for 1943.

DATE OF COMPLETION:

Completed for the duration

ASSIGNMENT:

None

RS-AL
GENETICS
Physiology

PROJECT STATUS SHEET

January 15, 1943

INDIVIDUAL VARIATION

FIELD DIVISION: Forest Management

WORK PROJECT: Forest Genetics

LINE PROJECT: Variation in percent sugar in the sap of sugar maple

PURPOSE:

To investigate the extent of inherent variation of percent sugar and to discover trees in which percent sugar is consistently high.

REVIEW OF PAST WORK:

Past work indicates probable inherent variation in percent sugar in the sap of hard maple. Variation within the same tree (throughout the day and around the circumference) is less than the difference between the lowest and highest trees. Previous to 1941 the sap from trees tapped at the Hopkins Memorial Forest varied from 1% to slightly over 4% in sugar content. In the spring of 1941 - apparently an abnormal sugar year - the sap of the individual trees tested at Hopkins varied from 2% to 10% in sugar content. This may have been the result of abnormal weather conditions. The individual trees showed approximately the same relative variation in sugar content as in previous years.

ACCOMPLISHMENTS DURING PAST YEAR:

No work during 1943

PLANS FOR NEXT YEAR:

No work planned during 1943.

DATE OF COMPLETION:

Closed for the duration. Should be continued when conditions permit.

ASSIGNMENT:

None

RS-AL
FIRE
Effects

PROJECT STATUS SHEET

January 15, 1943

EFFECTS OF FIRE

FIELD DIVISION: Forest Management Research

WORK PROJECT: Forest fire protection

LINE PROJECT: Effects

PURPOSE:

To determine the effects of fire on the tree, the forest, and the site, including effects of controlled fires on seedbed conditions and species composition, as a basis for formulating sound silvicultural and fire protection policies and plans.

REVIEW OF PAST WORK:

Comparative fire resistance determined for six important tree species, in 1930. In cooperation with the State of New Jersey, a revised method of fire damage appraisal was worked out; an 80-acre controlled burning experiment was begun in 1936-37, and a 14-acre one in 1940. Fire damage to standing trees from controlled burning was found to be reduced by use of the safety-strip method of pretreatment. A study of deterioration of fire-killed pine was started after the serious fire of April 20, 1941, on the Eastern Shore Forest. Monthly samplings were made for one year after the fire.

ACCOMPLISHMENTS DURING PAST YEAR:

Progress report and revised working plan prepared for 80-acre experiment in New Jersey. Even with annual burns over a 5-year period mortality among pitch and shortleaf pines 0.6" or larger at the time of the first burn was negligible. The amount of pine seedling reproduction was reduced on all areas having more than one burn in that period, particularly in the taller height classes. Areas having only one burn showed a net increase of approximately 400 seedlings per acre, although having much the same reductions in taller height classes. Loblolly and pond pine killed by a spring fire were unsuitable for sawlogs within six months due to damage from flathead borers. At twelve months the wood was still suitable for pulpwood when thoroughly dried, but charred knots were abundant and difficult to remove entirely. A report was prepared on this study.

PLANS FOR NEXT YEAR:

Maintain plot treatments in New Jersey as scheduled.

DATE OF COMPLETION:

1952 for both studies in New Jersey. Loblolly pine study completed.

ASSIGNMENT:

Little, Schnur, Somes

RP-AL
TIMBER CONVERSION
Fuelwood Utilization

PROJECT STATUS SHEET

January 15, 1943

FUELWOOD UTILIZATION

FIELD DIVISION: Forest Products

WORK PROJECT: Timber Harvesting and Conversion

LINE PROJECT: Fuelwood Utilization

PURPOSE:

To test uses and more efficient harvesting methods for small-sized and low grade trees in southern New England.

REVIEW OF PAST WORK:

Efforts for the past three years to obtain equipment and install a unit for burning hogged wood in a Connecticut state institution have been defeated for the time being. Tests were run on performance of a coal boiler in this institution as basis for comparison with hogged wood and time studies of hogged wood production completed and published. Published results of tests on charwood heaters, explored the use of wood gas by state institutions and cooperated in design and building of portable charcoal kilns. Work done on preliminary time studies, on use of tools, equipment and methods of crew organization for fuelwood production. Designed and tested equipment for hauling packaged fuelwood without success. As result of tests of power dragsaws, axes, wedges, buck saws, etc., it was determined that best method is to fell trees up to 12" d.b.h. with axe and pulp saw and use axe and two-man cross cut saw for larger trees, limbing and marking with axe. Buck within same diameter limits with same tools used in felling. Split with straight wedges and Oregon splitting maul. Pile only on sled when yarding. Bucking, splitting and piling should be done in a yard or at the roadside when possible.

ACCOMPLISHMENTS DURING PAST YEAR:

Published preliminary results of seasoning tests. Obtained cost of production and yield on two 90-cord stationary charcoal kilns and continued studies on cost of producing and transporting hogged fuel and time studies of fuelwood production and testing of new equipment. All material for testing of hogged wood in state institutions assembled at plant but actual tests delayed indefinitely due to conditions beyond our control.

PLANS FOR NEXT YEAR:

Labor shortage makes time and cost studies impractical but will continue them where possible; service tests will be made of several furnaces and stoves. Reporting and assisting in work done by other agencies in New England to be continued.

DATE OF COMPLETION:

Indefinite

ASSIGNMENT:

G. R. Trimble. In cooperation with state agencies in Connecticut.

RE-AL
SOCIAL BENEFITS
Anthracite Region

PROJECT STATUS SHEET

January 15, 1943

FOREST EMPLOYMENT POSSIBILITIES, ANTHRACITE REGION

FIELD DIVISION: Forest Economics Research

WORK PROJECT: Private Forestry

LINE PROJECT: Social aspects

PURPOSE:

To determine the extent and character of present and potential future employment in forests and forest industries of the Anthracite Region.

REVIEW OF PAST WORK:

Problem analysis prepared and working plans written for initial phases. In cooperation with R-7 possibilities explored of improving fire protection through construction of improvements and otherwise. A forest inventory of the region planned and initiated. Tax delinquency of forest land studied and report mimeographed, inventory completed in Luzerne, Lackawanna, Wyoming and part of Carbon Counties. Growth, drain, and requirements data compiled for Luzerne County. Land use map was prepared for Lackawanna County, and forest condition maps for Luzerne, Wyoming and Carbon Counties. Volume tables and weight-volume conversion tables compiled.

ACCOMPLISHMENTS DURING PAST YEAR:

An extensive report and a short, pictorial one were prepared for Luzerne County; inventory work in Carbon and Susquehanna Counties was completed and work initiated in Wayne and Sullivan Counties; data on forest area and volumes were compiled for Carbon, Columbia, Lackawanna and Wyoming Counties; a drain survey was started in Lackawanna County; Luzerne County was aided in evaluating tax delinquent land; cooperation was given in cruising and marking several areas for demonstration cuttings; a report was published on volume tables of commercial timber species in region; land use maps completed for five additional counties.

PLANS FOR NEXT YEAR:

Publish Luzerne County reports, complete inventory of nine remaining counties; compile forest area and resource data for five counties; estimate growth and drain for and publish brief reports on Lackawanna, Columbia, Wyoming, and Carbon counties; provide material on resource situation of region and action programs needed; initiate development of post-war forest rehabilitation plan.

DATE OF COMPLETION: Indefinite

ASSIGNMENT: Ineson, Goodell, Ferree

RE-AL
FOREST COOPERATIVES
Cooperstown

PROJECT STATUS SHEET

January 15, 1943

COOPERATIVE MANAGEMENT AND MARKETING FOR FARM WOODLANDS

FIELD DIVISION: Forest Economics

WORK PROJECT: Forest Cooperatives

LINE PROJECT: Cooperative management and marketing for farm woodlands

PURPOSE:

To define and seek solutions for the problems inherent in the cooperative management of farm woodlands, and the cooperative marketing and processing of forest products.

REVIEW OF PAST WORK:

In 1935, the Northeastern Forest Experiment Station was asked by people of Cooperstown to assist them in developing a woodland-owners cooperative. The Station assembled information on woodland areas and volume, and on rural relief, farm management and the place of woodlands in rural economy. It assisted local people to organize the Otsego Forest Products Cooperative Association, Incorporated, in 1935, helped obtain loans from the Farm Security Administration, served as administrator of these loans, advised the Association on by-laws, and on constructing a modern sawmill, and provided a timber marking and growing-stock control service to members. A special Cooperstown Rapid Reconnaissance System was devised for estimating timber and determining allowable cut. Studies have been made of grade and hardwood dimension recovery and of log procurement techniques. The place of the farm woodland in the farm management program on 90 member farms was studied in cooperation with the Bureau of Agricultural Economics.

ACCOMPLISHMENTS DURING THE PAST YEAR:

The inventory and marking service for members was continued; the records of all members' woodlots were revised and checked. A report was prepared on the study made in cooperation with the Bureau of Agricultural Economics. Work plans were developed for studies of cost and return for cutting, skidding and hauling; tree volume and value tables; grade return mill studies. A historical analysis of financial, educational, and promotional progress of the Association is underway.

PLANS FOR NEXT YEAR:

Inventory and marking services for members will be continued; the Government loan will be administered; and the Association will be assisted in solving membership, log procurement and management problems. Studies to be undertaken will include cost and return of cutting, skidding and hauling logs and manufacturing lumber; construction of volume and value tables; and analysis of educational and membership phases of the Association's activities.

DATE OF COMPLETION: Indefinite

ASSIGNMENT: Ineson, Bratton, Ferguson, (J.F.), Mrs. Kellogg

RE-AL
FOREST SURVEY
Inventory

PROJECT STATUS SHEET

January 15, 1943

FOREST SURVEY

FIELD DIVISION: Forest Economics

WORK PROJECT: Survey of Forest Resources

LINE PROJECT: Inventory of a 1.7 million acre unit in central New York State, surrounding Cooperstown.

PURPOSE:

To obtain data on forest resources, growth, and drain in this unit.

REVIEW OF PAST WORK:

Project initiated October 1941. About one-half of the field work was completed by January 1, 1942.

ACCOMPLISHMENTS DURING PAST YEAR:

Field work was completed in April. All primary wood-using plant owners were interviewed to obtain drain data. Tables detailing forest area, stand, growth and drain figures were compiled by June 30, 1942. Volume data were presented in Doyle and International 1/4" board foot volumes, and in cubic foot volumes, both including and excluding bark. An outline for a detailed report was prepared.

PLANS FOR NEXT YEAR:

Complete detailed written report on the Cooperstown unit for technical use and prepare a non-technical report for general distribution. Design a survey to cover the entire State of New York, using men from Civilian Public Service Camps, and prepare an estimate of the cost.

DATE OF COMPLETION:

Indefinite

ASSIGNMENT:

Ineson, Bratton, Ferguson

RS-AL-NE
SILVICULTURE
Harvest Cuttings
Spruce-Fir
(M-1)

PROJECT STATUS SHEET

January 15, 1943

HARVEST CUTTINGS

FIELD DIVISION: Forest Management

WORK PROJECT: Silviculture

LINE PROJECT: Harvest cuttings: Spruce types

PURPOSE:

To determine best regeneration methods and cutting techniques for developing all-aged spruce stands best suited to integrated pulpwood and sawtimber production.

REVIEW OF PAST WORK:

The technique for regenerating the commonly occurring spruce stands having an abundance of advance reproduction has been developed. Successful management consists mainly in protection of young growth from logging damage, subsequent windthrow, fire, and from excessive shading and crowding by hardwoods. In pure or nearly pure spruce-fir stands removing 1/4 to 1/2 the stand 10 to 15 years previous to the final cut results in good reproduction. Inadequate softwood reproduction in stands containing strong admixtures of northern hardwoods involves a problem not yet solved. Changing seedbed conditions, dense hardwood sprouts, and invading brush growth discourage spruce and fir reproduction following cutting of spruce stands. Weedings are necessary to maintain spruce and fir in competition with hardwoods which invade old-field spruce cutover areas. Partial cutting is just as economical as clearcutting for a given skidding distance in second-growth spruce-fir stands. Studies showed that logging damage to the reserve stand in selective cutting of spruce-fir is small when skidding is done with horses. Less than 4% is destroyed in the highly vulnerable fir stands, 2% in spruce-hardwoods and 1% in spruce. Damage from which recovery is probable may run 14, 7 and 3 percent respectively.

ACCOMPLISHMENTS DURING PAST YEAR:

Completed publication on logging damage and put various studies in shape to leave indefinitely. Completed set of "show window" selection plots in cooperation with state of New Hampshire, and had them cut.

PLANS FOR NEXT YEAR: None. Projects closed for duration of war.

DATE OF COMPLETION: Unknown

ASSIGNMENT: None

RS-AL-NE
SILVICULTURE
Harvest Cuttings
Northern Hardwoods
(M-4)

PROJECT STATUS SHEET

January 15, 1943

HARVEST CUTTINGS

FIELD DIVISION: Forest Management

WORK PROJECT: Silviculture

LINE PROJECT: Harvest cuttings: Northern hardwoods

PURPOSE:

To test clear cutting, tree selection and group selection in northern hardwoods.

REVIEW OF PAST WORK:

Many-aged northern hardwood types cut selectively on Bartlett Experimental Forest and compared with clear cutting and group selection. Results after five years indicate that maximum net increment can be obtained only with a well-stocked reserve stand. Small hardwoods showed greatest stimulation, but medium and large sized hemlock made better growth when released than small trees. Sugar maple showed the greatest and yellow birch the least increase in diameter growth following partial cutting. There was very little stimulation of trees above 18" d.b.h. Stands vulnerable to wind damage immediately after partial cutting, but this overcome as reserve trees closed the crown canopy. Clear cutting of one-eighth acre patches (group selection) gives best type of reproduction.

ACCOMPLISHMENTS DURING PAST YEAR:

Completed work on a series of fifteen sample plots, each three acres in area, in a 100-acre tract of all-aged northern hardwoods. Plots marked for selection cutting, four degrees, together with a check replicated three times. Completed analysis of reserve stand growth five years after selection cutting. Publication "Suggestions for Management of Northern Hardwoods" accepted by Journal of Forestry.

PLANS FOR NEXT YEAR: Project closed for the duration of the war.

DATE OF COMPLETION: Unknown

ASSIGNMENT: None

RS-AL-NE
SILVICULTURE
Harvest Cuttings
White Pine
(M-3)

PROJECT STATUS SHEET

January 15, 1943

HARVEST CUTTINGS

FIELD DIVISION: Forest Management

WORK PROJECT: Silviculture

LINE PROJECT: Harvest cuttings: White pine types

PURPOSE:

To test harvest cutting methods with special reference to optimum growing stock and evaluation of factors affecting natural reproduction.

REVIEW OF PAST WORK:

Problem analysis covered work of other agencies in region. Permanent plots dating back as far as 1906 analyzed and worth while ones remeasured. Results presented at York County Farm Forest Products, Inc. Established cutting plots in mature pine-hemlock and in old field pine and arranged for cutting. Continued work on Massabesic Experimental Forest in Maine for renewed attack on white pine problem. Published "Repair your woodlot" in cooperation with Maine Extension Service. Completed manuscript on Blister Rust control in white pine woodland management in cooperation with Blister Rust Control Office. Continued work on handling white pine woodlands for publication as a bulletin.

ACCOMPLISHMENTS DURING PAST YEAR:

Completed selection cutting on harvest cutting plots set up last year. Manuscript for bulletin on handling white pine woodlands being prepared for publication. Closed Massabesic Forest for the duration and put all project work in shape for shelving until after the war.

PLANS FOR NEXT YEAR:

Project closed for the duration of the war.

DATE OF COMPLETION:

Unknown

ASSIGNMENT:

None

RS-AL-NE
SILVICULTURE
Stand Improvement
Spruce-Fir
(M-1)

PROJECT STATUS SHEET

January 15, 1943

STAND IMPROVEMENT

FIELD DIVISION: Forest Management

WORK PROJECT: Silviculture

LINE PROJECT: Stand improvement in spruce types

PURPOSE:

To develop measures for increasing the production and growth rate of spruce and fir, and improving the quality of growth.

REVIEW OF PAST WORK:

Girdling of defective overtopping hardwoods, shown to be an economical and effective method of increasing growth rate of spruce, widely adopted as a measure of stand improvement. Thinning of old-field spruce stands also shown to be a practical measure for increasing annual increment. Experiments in weeding of young spruce stands on cut-over areas and of thinning at later stages are under way. Selective pruning of crop trees to improve the quality of sawtimber yield is also in progress. Elimination of undesirable tree growth from planting sites, plantations, and stands of natural reproduction by poisoning and girdling has been studied. Poisoning, while killing the trees, often fails to prevent subsequent sprouting or root suckering. With aspen, girdling without notching is most effective in eliminating root suckers. Data on hurricaned plots checked over for information on wind damage. Small pruning experiment started in white spruce plantation. Final work on girdling plots showed that notching should be employed only on trees with infolding seams as it is costly; peeling should be used during bark slipping period; double hacking where only inefficient labor available.

ACCOMPLISHMENTS DURING PAST YEAR:

Began summary of spruce swamp plots and an analysis of weeding and thinning work. Closing of station in June halted this work.

PLANS FOR NEXT YEAR:

Project closed for duration of war.

DATE OF COMPLETION:

Unknown

ASSIGNMENT:

None

RS-AL-NE
SILVICULTURE
Stand Improvement
Northern Hardwoods
(M-4)

PROJECT STATUS SHEET

January 15, 1943

STAND IMPROVEMENT

FIELD DIVISION: Forest Management

WORK PROJECT: Silviculture

LINE PROJECT: Stand improvement in Northern Hardwoods

PURPOSE:

To determine present methods of thinning, weeding, and mowing in northern hardwoods.

REVIEW OF PAST WORK:

Residual stand of thinned yellow birch lots increased 4% annually over five-year period. In spite of losses from exposure increase in net volume was three times as great on thinned as on the check area. Evaporation and wind movement increased 50% as result of heavy thinning, but approached normal as stand closed.

The practicability of weeding young northern hardwood seems questionable. The more valuable northern hardwood species are aggressive in sampling stands and will ordinarily survive to make up a well-stocked stand. If weeding is undertaken only stems actively competing with the selective crop trees should be removed. A heavy release causes snow damage. Poisoning of weed trees was tried, but is not economical as weeding does not open up a stand sufficiently to induce sprouting.

Mowing of stagnating, crooked, advanced reproduction results in a fast-growing stand of straight saplings.

ACCOMPLISHMENTS DURING PAST YEAR:

Five-year analysis of thinning in stands of various composition and density started but dropped when computing force discontinued. Article accepted by Journal of Forestry "Suggestions for Improvement of Northern Hardwoods" includes a brief discussion of various stand improvement measures in the northern hardwoods type.

PLANS FOR NEXT YEAR:

Project closed for duration of war.

DATE OF COMPLETION: Unknown

ASSIGNMENT: None

RS-AL-NE
SILVICULTURE
Stand Improvement
White Pine
(M-3)

PROJECT STATUS SHEET

January 15, 1943

STAND IMPROVEMENT IN WHITE PINE

FIELD DIVISION: Forest Management

WORK PROJECT: Silviculture

LINE PROJECT: Stand improvement: White pine types

PURPOSE:

To refine and test measures to increase increment, quality, and volume production of white pine types, as determined by previous work of other agencies.

REVIEW OF PAST WORK:

Analysis made of data from old permanent sample plots and of the work of Yale, Harvard, Syracuse and other agencies in thinning, weeding, release cutting and pruning. Established experiments at Massabesic Forest in Maine and applied known results on north unit of Massabesic Forest to improve stand in preparation for management. Cooperated on gypsy moth experiments with Bureau of Entomology and published article and technical note on "Collect the Bounty on your Wolf Trees".

ACCOMPLISHMENTS DURING PAST YEAR:

Completed cutting by timber sales on white pine release plots and started cutting on a series of thinning plots in southern white cedar. All experiments closed in early spring due to closing of Northeastern Station.

PLANS FOR NEXT YEAR:

Project closed for the duration of the war.

DATE OF COMPLETION:

Unknown

ASSIGNMENT:

None

RS-AL-NE
SILVICULTURE
Silvics
Spruce-Fir
(M-1)

PROJECT STATUS SHEET

January 15, 1943

SILVICS

FIELD DIVISION: Forest Management

WORK PROJECT: Silviculture

LINE PROJECT: Silvics: Spruce logging slash

PURPOSE:

To determine the effect of slash on reproduction and the rate of slash decay and its relationship to the protection of forests from fire.

REVIEW OF PAST WORK:

Dense softwood slash not only kills advance reproduction beneath it but effectually prevents the establishment of new reproduction for a period of 15 to 20 years. Hardwood slash rarely hinders reproduction seriously for more than five or six years. The rate at which slash decomposes varies greatly with respect to species, as well as size of material. Beech, birch, and maple slash decomposes from two to three times as fast as spruce and fir. Spruce slashings persist as an abnormal fire hazard for 15 to 20 years or more. The third 5-year measurement of a set of 3 major slash plots was completed, and analysis begun in preparation for manuscript in cooperation with Pathology.

ACCOMPLISHMENTS DURING PAST YEAR:

Analysis partly completed and being continued by the office of Forest Pathology in New Haven.

PLANS FOR NEXT YEAR:

None except to cooperate if necessary in completion of analysis and comprehensive report. Experiment Station's part in this project closed with the closing of the Northeastern Station.

DATE OF COMPLETION:

Unknown

ASSIGNMENT:

None

RS-AL-NE
SILVICULTURE
Silvics
White-Pine
(M-3)

PROJECT STATUS SHEET

January 15, 1943

SILVICS

FIELD DIVISION: Forest Management

WORK PROJECT: Silviculture

LINE PROJECT: Silvics: Northern White Pine

PURPOSE:

To evaluate ecological factors affecting establishment, growth and development of regeneration in white pine types.

REVIEW OF PAST WORK:

Considerable work on site factors affecting regeneration, slash disposal effect, etc., done by Harvard, Yale, University of Vermont and other agencies. White pine sunscald study continued, the data forming a basis for a Doctor's dissertation completed in May, 1942. Published "Why Phenology?" in Journal of Forestry. Established experiment to test distance and direction of natural seeding from white pine and advised on work of private owners in correct seeding in burned-over plantations of Massachusetts. Began study in cooperation with genetics project on single parent progeny of white pine.

ACCOMPLISHMENTS DURING PAST YEAR:

Completed thesis on sunscald study and put other studies into shape to leave indefinitely.

PLANS FOR NEXT YEAR:

Project closed with closing of Northeastern Station. Will attempt to continue some work on the sunscald study if able to get to the Massabesic Forest.

DATE OF COMPLETION:

Unknown

ASSIGNMENT:

None

RS-AL-NE
MENSURATION
Tree Studies
(ME-3)

PROJECT STATUS SHEET

January 15, 1943

STAND DEVELOPMENT, GROWTH, AND YIELD

FIELD DIVISION: Forest Management Research

WORK PROJECT: Mensuration

LINE PROJECT: Tree studies: Volume tables for species in white pine types.

PURPOSE:

To prepare volume tables, in cooperation with University of Maine, for white pine, hemlock and various species of hardwoods used for fuel.

REVIEW OF PAST WORK:

As available volume tables for white pine and hemlock appear to be inadequate for utilization standards of southern Maine, measurements on about 400 white pine trees and 50 hemlock trees taken and sent to Professor Demeritt of the University of Maine who completed preliminary Maine rule volume table. Measurements taken on some hardwood trees for fuelwood cordwood tables.

ACCOMPLISHMENTS DURING PAST YEAR:

Some additional measurements taken and sent to Professor Demeritt and some tables completed by him. Tables being used in white pine bulletin being prepared by Huberman.

PLANS FOR NEXT YEAR:

Professor Demeritt will continue working on volume tables but no additional data to be taken by experiment station as white pine project closed for duration of the war.

DATE OF COMPLETION:

Unknown

ASSIGNMENT:

None

RS-AL-NE
MENSURATION
Stand Studies
(ME-3)

PROJECT STATUS SHEET

January 15, 1943

STAND DEVELOPMENT, GROWTH AND YIELD

FIELD DIVISION: Forest Management

WORK PROJECT: Mensuration

LINE PROJECT: Stand studies, composition, growth, mortality and yield of northern hardwoods.

PURPOSE:

To provide the factual information required as to kinds, sizes, and quantities of forest products which will be produced within a given period of time so that forest management can be directed toward maximum value return under sustained yield handling of northern hardwood stands.

REVIEW OF PAST WORK:

The basis for this was to be measurements and some remeasurements on 52 permanent plots and 114 extensive plots in Maine, New Hampshire, Vermont and New York plus surveys of experimental forests and some 5,000 increment cores. A special study of mortality was initiated and an increment core examining device perfected. Data on hurricane damage were analyzed. Nothing has been done on this for several years.

ACCOMPLISHMENTS DURING PAST YEAR:

None. Reineke who was in charge of the project was transferred early in the spring.

PLANS FOR NEXT YEAR:

None. Project closed for the duration of the war.

DATE OF COMPLETION:

Unknown

ASSIGNMENT:

None

RS-AL-NE
REGENERATION
Planting

PROJECT STATUS SHEET

January 15, 1943

FOREST PLANTING

FIELD DIVISION: Forest Management Research

WORK PROJECT: Regeneration

LINE PROJECT: Planting

PURPOSE:

To devise planting techniques insuring high survival, rapid growth and best quality of plantation.

REVIEW OF PAST WORK:

Establishment of mixed conifer-hardwood plantation using strip mixtures and groupwise arrangement started in 1933 at Chenango Experimental Forest in New York. Deferred planting of hardwood in mixed species plantations begun in 1939.

ACCOMPLISHMENTS DURING PAST YEAR:

None. Project closed.

PLANS FOR NEXT YEAR:

None

DATE OF COMPLETION:

Indefinite

ASSIGNMENT:

None

RE-AL-NE
FOREST SURVEY
Inventory

PROJECT STATUS SHEET

January 15, 1943

FOREST SURVEY

FIELD DIVISION: Forest Economics

WORK PROJECT: Survey of forest resources

LINE PROJECT: Cooperative technical supervision of an inventory and type map of forests in southwestern Maine.

PURPOSE:

To insure adequacy of field methods in the CCC map and inventory of the white pine region of Maine. To apply results to such problems as silvicultural control of gypsy moth.

REVIEW OF PAST WORK:

Between 1936 and 1938 crews working from four CCC camps completed an inventory and type map of 79 towns aggregating 1,890,000 acres. Types were mapped according to the classification of the Society of American Foresters. Inventory computations were not completed, but records have been organized for subsequent use. An article presenting a standard legend for the 96 forest cover types recognized by the S.A.F. for the eastern United States published as an Occasional Paper.

ACCOMPLISHMENTS DURING THE PAST YEAR:

Article on the opportunity for silvicultural control of the gypsy moth submitted for publication. Part of the Maine survey data loaned to Forest Commissioner of Maine for tabulation.

PLANS FOR NEXT YEAR:

Project will lie dormant for duration of war.

DATE OF COMPLETION:

Unknown

ASSIGNMENT:

None

RI-AL-NE
STREAMFLOW

PROJECT STATUS SHEET

January 15, 1943

STREAMFLOW ON FORESTED WATERSHEDS

FIELD DIVISION: Forest Influences

WORK PROJECT: Water behavior and run-off

LINE PROJECT: Relation of forest and herbaceous cover to streamflow

PURPOSE:

To study the streamflow on small forested watersheds and the effect of changes in vegetative cover and land use practices.

REVIEW OF PAST WORK:

At the Chenango Experimental Forest, a weir and stream-gauging station with two ground water measuring wells have been in operation since 1938. Four additional measuring wells were added in 1939, and a silting basin was constructed above the weir. Discharge measurements were made during low water stages for obtaining weir ratings. At the Hopkins Memorial Experimental Forest two weirs have been in operation since 1939 and construction has been under way on three additional installations.

Hydrologic and climatological measurements made at Chenango until October 1941. Weir not rated. Hydrologic data continued at Hopkins on completedweirs and climatic records continued. Columbus type weir at No. 5 location not installed as CCC and other emergency labor not available in 1941.

ACCOMPLISHMENTS DURING THE PAST YEAR:

None. Records stopped when Northeastern Station closed.

PLANS FOR NEXT YEAR:

None

DATE OF COMPLETION:

Indefinite

ASSIGNMENT:

None